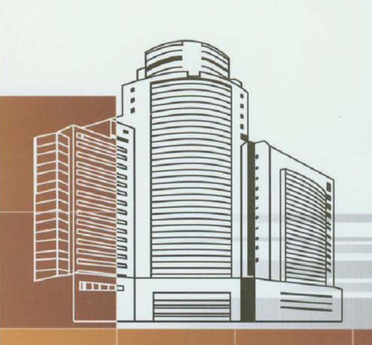
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实用规划教材

21世纪全国应用型本科土木建筑系列实用规划教材



工程管理专业英语

主 编 王竹芳

北京大学出版社
PEKING UNIVERSITY PRESS

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内 容 简 介

本书主要内容包括：项目管理组织；雇主；成本估算；项目预算；承包商；工程承包合同的类型；招标程序；项目融资；关键路径法；进度控制；创新和技术与经济的可行性；索赔、争端和仲裁；各类保证范例格式等。本书选材广泛、内容新颖、针对性强、难度适中，有助于提高读者阅读相关专业的英语书刊和文献的能力。

本书为高等院校工程管理专业本科学生学习专业英语而编写，亦可作为土木工程专业英语教材，同时也可供广大从事工程管理、土木工程，且具备一定英语基础的工程技术人员及自学者学习参考。

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Unit 1　Organizing for Project Management

Organization of Project Participants

The top management of the owner sets the overall policy and selects the appropriate organization to take charge of a proposed project. Its policy will dictate how the project life cycle is divided among organizations and which professionals should be engaged. Decisions by the top management of the owner will also influence the organization to be adopted for project management. In general, there are many ways to decompose a project into stages. The most typical ways are:

- Sequential processing whereby the project is divided into separate stages and each stage is carried out successively in sequence.
- Parallel processing whereby the project is divided into independent parts such that all stages are carried out simultaneously.
- Staggered processing whereby the stages may be overlapping, such as the use of phased design-construct procedures for fast track operation.

It should be pointed out that some decompositions may work out better than others, depending on the circumstances. In any case, the prevalence of decomposition makes the subsequent integration particularly important. The critical issues involved in organization for project management are:

- How many organizations are involved?
- What are the relationships among the organizations?
- When are the various organizations brought into the project?

There are two basic approaches to organize for project implementation, even though many variations may exist as a result of different contractual relationships adopted by the owner and builder. These basic approaches are divided along the following lines:

- **Separation of organizations.** Numerous organizations serve as consultants or contractors to the owner, with different organizations handling design and construction functions. Typical examples which involve different degrees of separation are: traditional sequence of design and construction; professional construction management.
- **Integration of organizations.** A single or joint venture consisting of a number of organizations with a single command undertakes both design and construction functions. Two extremes may be cited as examples: owner-builder operation in which all work will be handled in house by force account; turnkey operation in which all work is contracted to a vendor which is responsible for delivering the completed project.

The organization for the management of construction projects may vary from case to case. On one extreme, each project may be staffed by existing personnel in the functional divisions of the organization on an ad-hoc basis as shown in Figure 1.1 until the project is completed. This arrangement is referred to as the matrix organization as each project manager must negotiate all resources for the project from the existing organizational framework. On the other hand, the organization may consist of a small central functional staff for the exclusive purpose of supporting various projects, each of which has its functional divisions as shown in Figure 1.2 This decentralized set-up is referred to as the project-oriented organization as each project manager has autonomy in managing the project. There are many variations of management style between these two extremes, depending on the objectives of the organization and the nature of the construction project. For example, a large chemical company with in-house staff for planning, design and construction of facilities for new product lines will naturally adopt the matrix organization. On the other hand, a construction company whose existence depends entirely on the management of certain types of construction projects may find the project-oriented organization particularly attractive. While organizations may differ, the same basic principles of management structure are applicable to most situations.

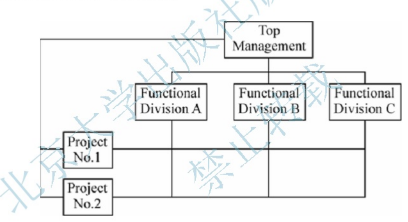


Figure 1.1 A Matrix Organization

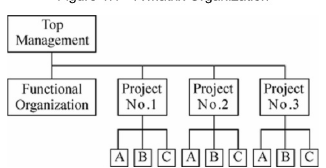


Figure 1.2 A Project-Oriented Organization

To illustrate various types of organizations for project management, we shall consider two examples, the first one representing an owner organization while the second one representing the organization of a construction management consultant under the direct supervision of the owner.

Traditional Designer-Constructor Sequence

For ordinary projects of moderate size and complexity, the owner often employs a designer (an architectural/engineering firm) which prepares the detailed plans and specifications for the constructor (a general contractor). The designer also acts on behalf of the owner to oversee the project implementation during construction. The general contractor is responsible for the construction itself even though the work may actually be undertaken by a number of specialty subcontractors.

The owner usually negotiates the fee for service with the architectural/engineering (A/E) firm. In addition to the responsibilities of designing the facility, the A/E firm also exercises to some degree supervision of the construction as stipulated by the owner. Traditionally, the A/E firm regards itself as design professionals representing the owner who should not communicate with potential contractors to avoid collusion or conflict of interest. Field inspectors working for an A/E firm usually follow through the implementation of a project after the design is completed and seldom have extensive input in the design itself. Because of the litigation climate in the last two decades, most A/E firms only provide observers rather than inspectors in the field. Even the shop drawings of fabrication or construction schemes submitted by the contractors for approval are reviewed with a disclaimer of responsibility by the A/E firms.

The owner may select a general constructor either through competitive bidding or through negotiation. Public agencies are required to use the competitive bidding mode, while private organizations may choose either mode of operation. In using competitive bidding, the owner is forced to use the designer-constructor sequence since detailed plans and specifications must be ready before inviting bidders to submit their bids. If the owner chooses to use a negotiated contract, it is free to use phased construction if it so desires.

The general contractor may choose to perform all or part of the construction work, or act only as a manager by subcontracting all the construction to subcontractors. The general contractor may also select the subcontractors through competitive bidding or negotiated contracts. The general contractor may ask a number of subcontractors to quote prices for the subcontracts before submitting its bid to the owner. However, the subcontractors often cannot force the winning general contractor to use them on the project. This situation may lead to practices known as bid shopping and bid peddling. Bid shopping refers to the situation when the general contractor approaches subcontractors other than those whose quoted prices were used in the winning contract in order to seek lower priced subcontracts. Bid peddling refers to the actions of subcontractors who offer lower priced subcontracts to the winning general subcontractors in order to dislodge the subcontractors who originally quoted prices to the general contractor prior to its bid submittal. In both cases, the quality of construction may be sacrificed, and some state statutes forbid these practices for public projects.

Although the designer-constructor sequence is still widely used because of the public perception of fairness in competitive bidding, many private owners recognize the disadvantages

of using this approach when the project is large and complex and when market pressures require a shorter project duration than that which can be accomplished by using this traditional method.

Professional Construction Management

Professional construction management refers to a project management team consisting of a professional construction manager and other participants who will carry out the tasks of project planning, design and construction in an integrated manner. Contractual relationships among members of the team are intended to minimize adversarial relationships and contribute to greater response within the management group. A professional construction manager is a firm specialized in the practice of professional construction management which includes:

- Work with owner and the A/E firms from the beginning and make recommendations on design improvements, construction technology, schedules and construction economy.
- Propose design and construction alternatives if appropriate, and analyze the effects of the alternatives on the project cost and schedule.
- Monitor subsequent development of the project in order that these targets are not exceeded without the knowledge of the owner.
- Coordinate procurement of material and equipment and the work of all construction contractors, and monthly payments to contractors, changes, claims and inspection for conforming design requirements.
- Perform other project related services as required by owners.

Professional construction management is usually used when a project is very large or complex. The organizational features that are characteristics of mega-projects can be summarized as follows:

- The overall organizational approach for the project will change as the project advances. The "functional" organization may change to a "matrix" which may change to a "project" organization (not necessarily in this order).
- Within the overall organization, there will probably be functional, project, and matrix suborganizations all at the same time. This feature greatly complicates the theory and the practice of management, yet is essential for overall cost effectiveness.
- Successful giant, complex organizations usually have a strong matrix-type suborganization at the level where basic cost and schedule control responsibility is assigned. This suborganization is referred to as a "cost center" or as a "project" and is headed by a project manager. The cost center matrix may have participants assigned from many different functional groups. In turn, these functional groups may have technical reporting responsibilities to several different and higher tiers in the organization. The key to a cost effective effort is the development of this project suborganization into a single team under the leadership of a strong project manager.
- The extent to which decision-making will be centralized or decentralized is crucial to

the organization of the mega-project.

Consequently, it is important to recognize the changing nature of the organizational structure as a project is carried out in various stages.

Owner-Builder Operation

In this approach an owner must have a steady flow of on-going projects in order to maintain a large work force for in-house operation. However, the owner may choose to subcontract a substantial portion of the project to outside consultants and contractors for both design and construction, even though it retains centralized decision making to integrate all efforts in project implementation.

Example 1.1 U.S. Army Corps of Engineers Organization.

The District Engineer's Office of the U.S. Army Corps of Engineers may be viewed as a typical example of an owner-builder approach as shown in Figure 1.3.

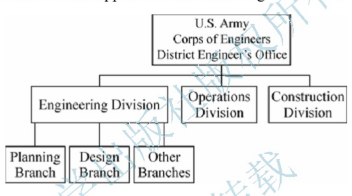


Figure 1.3 Organization of a District of Corps of Engineers

In the District Engineer's Office of the U.S. Corps of Engineers, there usually exist an Engineering Division and an Operations Division, and, in a large district, a Construction Division. Under each division, there are several branches. Since the authorization of a project is usually initiated by the U.S. Congress, the planning and design functions are separated in order to facilitate operations. Since the authorization of the feasibility study of a project may precede the authorization of the design by many years, each stage can best be handled by a different branch in the Engineering Division. If construction is ultimately authorized, the work may be handled by the Construction Division or by outside contractors. The Operations Division handles the operation of locks and other facilities which require routine attention and maintenance.

When a project is authorized, a project manager is selected from the most appropriate branch to head the project, together with a group of staff drawn from various branches to form the project team. When the project is completed, all members of the team including the project manager will return to their regular posts in various branches and divisions until the next project assignment. Thus, a matrix organization is used in managing each project.

Turnkey Operation

Some owners wish to delegate all responsibilities of design and construction to outside

consultants in a turnkey project arrangement. A contractor agrees to provide the completed facility on the basis of performance specifications set forth by the owner. The contractor may even assume the responsibility of operating the project if the owner so desires. In order for a turnkey operation to succeed, the owner must be able to provide a set of unambiguous performance specifications to the contractor and must have complete confidence in the capability of the contractor to carry out the mission.

This approach is the direct opposite of the owner-builder approach in which the owner wishes to retain the maximum amount of control for the design-construction process.

Example 1.2 An Example of a Turnkey Organization.

A 150 MW power plant was proposed in 1985 by the Texas-New Mexico Power Company of Fort Worth, Texas, which would make use of the turnkey operation. Upon approval by the Texas Utility Commission, a consortium consisting of H.B. Zachry Co., Westinghouse Electric Co., and Combustion Engineering Inc., would design, build and finance the power plant for completion in 1990 for an estimated construction cost of $200 million in 1990 dollars. The consortium would assume total liability during construction, including debt service costs, and thereby eliminate the risks of cost escalation to rate payers, stockholders and the utility company management.

Leadership and Motivation for the Project Team

The project manager, in the broadest sense of the term, is the most important person for the success or failure of a project. The project manager is responsible for planning, organizing and controlling the project. In turn, the project manager receives authority from the management of the organization to mobilize the necessary resources to complete a project.

The project manager must be able to exert interpersonal influence in order to lead the project team. The project manager often gains the support of his/her team through a combination of the following:

- Formal authority resulting from an official capacity which is empowered to issue orders.
- Reward and/or penalty power resulting from his/her capacity to dispense directly or indirectly valued organization rewards or penalties.
- Expert power when the project manager is perceived as possessing special knowledge or expertise for the job.
- Attractive power because the project manager has a personality or other characteristics to convince others.

In a matrix organization, the members of the functional departments may be accustomed to a single reporting line in a hierarchical structure, but the project manager coordinates the activities of the team members drawn from functional departments. The functional structure within the matrix organization is responsible for priorities, coordination, administration and final decisions

pertaining to project implementation. Thus, there are potential conflicts between functional divisions and project teams. The project manager must be given the responsibility and authority to resolve various conflicts such that the established project policy and quality standards will not be jeopardized. When contending issues of a more fundamental nature are developed, they must be brought to the attention of a high level in the management and be resolved expeditiously.

In general, the project manager's authority must be clearly documented as well as defined, particularly in a matrix organization where the functional division managers often retain certain authority over the personnel temporarily assigned to a project. The following principles should be observed:

- The interface between the project manager and the functional division managers should be kept as simple as possible.
- The project manager must gain control over those elements of the project which may overlap with functional division managers.
- The project manager should encourage problem solving rather than role playing of team members drawn from various functional divisions.

Questions

1. What are the most typical ways to decompose a project into stages?
2. How many issues are involved in organization for project management? What are they?
3. Say about the two basic approaches to organization for project management. How these basic approaches are divided?
4. What's the matrix organization for the management of construction projects?
5. What's the project-oriented organization for the management of construction projects?
6. Summarize the organizational features that are characteristics of mega-projects.
7. Why is it important to recognize the changing nature of the organizational structure as a project is carried out in various stages?
8. What organization is used in managing the owner-builder project?
9. The project manager is the most important person for the success or failure of a project, why?
10. How does the project manager gain the support of his/her team?

Vocabulary, Phrases and Expressions

project participants：项目参与方
sequential processing：串行处理；顺序加工
parallel processing：并行处理；多重处理
staggered processing：交叉处理；错列处理

separation of organizations：独立型组织
integration of organizations：集约型组织
owner-builder operation：业主自行建造项目
turnkey operation：交钥匙项目
matrix organization：矩阵式组织形式
project-oriented organization：以项目为导向的组织
an architectural/engineering firm：建筑/设计公司
a general contractor：总承包商
specialty subcontractors：专业分包商
supervise：监理
field inspectors：现场检查员
field observers：现场观察员
shop drawings of fabrication：车间安装图
construction schemes：施工计划；施工安排
designer-constructor sequence：设计施工顺序模式
subcontract：分包合同
quality of construction：建筑质量
construction management：施工管理
design and construction alternatives：设计或施工的替代方案
project cost and schedule：项目的成本和进度
procurement of material and equipment：材料和设备的采购
monthly payments：月度付款
cost center：成本中心
decision-making：决策
on-going projects：在建项目
engineering division：工程设计部门
operations division：运营部门
construction division：施工部门
outside contractors：外部承包商
authorization：授权
feasibility study of a project：项目可行性研究
project team：项目团队
performance specifications：设计任务说明书；规范(规格说明书)
liability during construction：建设期债务
debt service：还本付息；偿债
project manager：项目经理

参 考 译 文

第 1 单元　项目管理组织

项目各参与方的组织

业主的高层管理负责设定总体方针，同时选择合适的组织来负责给定的项目。在业主的方针中会指出如何将项目生命周期中的任务划分给不同的组织，以及聘用什么样的专业人员。业主高层管理所做出的决策也将对被选出进行项目管理的组织产生影响。通常会有多种分解项目阶段的方法，其中最为典型的是：

- 顺序划分，项目被划分成独立的几个阶段，各阶段按连续顺序进行。
- 平行划分，项目被划分成独立的几个部分，各部分同时进行。
- 交叉划分，项目阶段可以进行搭接。例如，快速路径法的应用。

这里需要指出的是哪种分解方法更为有效，这完全取决于项目的具体情况。在多数情况下，按顺序划分的方法更为普遍一些。涉及项目管理的关键问题有：

- 项目涉及多少个组织？
- 各组织间的联系是什么？
- 各组织何时介入项目？

尽管由于业主和承包商之间所采用合同条件的不同会产生很多种完成项目的组织形式，但基本形式只有两种，并按照下面的思路来划分。

- **独立型组织**。相对于业主，会出现咨询方或承包商等多种分别处理设计和施工任务的组织，涉及这种类型组织的典型例子有：设计和施工的传统顺序模式；专业化的建设项目管理模式。
- **集约型组织**。由不同组织组成一个单一的联合体，以统一指令来承担设计和施工任务。这里介绍两种极端的例子：业主自行建造项目，在这里所有工作均由业主内部部门处理；交钥匙项目，即合同的所有工作内容都交给一个卖方，由他负责向业主提交完工项目。

建设项目的管理组织形式可视具体情况而定。一种情况是，项目所需人员由职能部门提供，由专职项目经理领导直至项目结束，如图 1.1 所示。在这种形式下，项目经理必须从现有的组织框架中协调并获取项目所需的各种资源，因而这种组织形式也被称为矩阵式组织。而另一种组织形式是如图 1.2 所示的直线式组织，在这种组织形式下，组织为每一个项目提供资源上的必要支持，因而也被称为以项目为导向的组织，每位项目经理都有管理项目的自治权。除此之外，还有其他类型的项目组织可供选择，这取决于组织目标和建设项目的特点。例如，一家由内部力量来计划、设计和建设新产品设备的大型公司很自然地会选择矩阵式组织。然而，完全依靠建设项目管理求生存的建筑公司，却倾向于选择以项目为导向的组织。尽管组织形式有所不同，但管理结构的基本原则却适用于大多数情况。

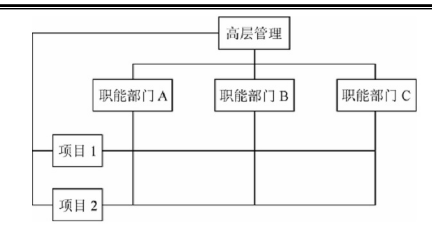


图 1.1　矩阵式组织

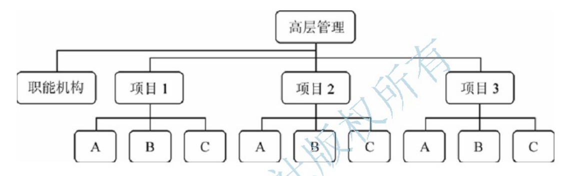


图 1.2　以项目为导向的组织

为了理解项目管理的不同组织形式，可以认为第一个例子所代表的是一个业主的管理组织，而第二个例子所代表的是一个业主直接监督下的建筑管理咨询方的管理组织。

传统的设计—承包模式

对于那些规模和复杂程度适中的普通项目，业主通常会选择一家设计单位(建筑设计公司)为承包商(总承包商)提供项目所需的详细规划和设计。设计单位同时代表业主在施工期间监督项目的执行。尽管具体工作由众多的专业分包商来承担，但却由总承包商对工程本身负责。

业主通常会跟建筑/设计(A/E)公司进行服务费用的谈判。除了承担设计责任外，A/E 公司还行使一定程度的、由业主规定的、监督施工的职责。传统上，A/E 公司是把自己当作业主代表，并且不和潜在的承包商直接联系，以回避利益冲突的专业设计咨询人员。为 A/E 公司工作的现场监督人员通常在设计完成之后对项目实施跟踪检查，并且很少直接参与设计本身。由于在过去 20 年里诉讼之风渐盛，为避免诉讼纠纷，大多数的 A/E 公司只向工地派观察员，而不再派现场监督。现在，由承包商提交获准的车间安装详图和项目计划，也被视作 A/E 公司推卸责任。

业主既可通过竞争性招标也可通过谈判来选择总承包商。一般公共机构被要求使用竞争性招标方式，而私人组织可采用两种方式中的任何一种。在竞争性招标中，业主将不得不采用设计—施工顺序模式，因为在邀请竞标者投标前，详细的规划和设计应已完成。如果采用谈判的合同方式，那么业主在选择建造模式方面有很大的余地。

总承包商可选择自己完成建设项目的全部工作或其中的一部分，也可以把建设项目全部分包给分包商，自己只作为管理者。总承包商同样既可用竞争性招标也可通过谈判来选

择分包商。总承包商在向业主投标报价之前会先向分包商就分包合同进行询价。然而，分包商却不能强迫总承包商在中标后一定在项目上选择自己，这实际上就产生了所谓的“招标压价”和“投标兜售”。“招标压价”是指为了降低分包合同价格，总承包商在中标后并不与其报价已被采纳在中标合同中的分包商签分包合同，转而另寻求其他分包商。“投标兜售”则是指分包商的行为，即有些分包商为了挤掉其他报价比他早的分包商，愿意给总承包商提供更低价格的分包合同。在这两种情形下，建筑质量都会受到损害，因而有些州的法令禁止在公共项目中进行这些形式的操作。

尽管由于公众对于竞争性招标公正性的认同而使得设计－施工模式仍然得以广泛的使用，但许多私营业主也意识到了这种模式的缺点，即当项目规模巨大且较为复杂时，或者当项目迫于市场压力而需尽早完工时，该模式便显得力不从心。

专业化建设项目管理模式

专业化建设项目管理是指由专业建设项目经理(CM)和其他各方组成的项目管理队伍，这个项目管理队伍负责完成项目的规划、设计和施工等任务的集成与管理。这种模式试图将项目组织间的对立情绪降低到最低程度，同时有助于管理队伍内部的协调。专业化的 CM 是指从事下面工作的公司：

- 在项目前期，同业主和 A/E 公司一道工作，并就设计的改进、施工技术、进度安排和建筑经济提供参考建议。
- 如果合适，提议设计或施工的替代方案，并分析其对项目成本和进度的影响。
- 监督项目的进展，以防止目标的偏离。
- 处理与协调材料和设备的采购、承包商的施工活动、承包商月进度款的支付、设计变更、索赔和监督设计要求的落实。
- 执行业主和项目有关的其他服务要求。

当项目规模很大且较为复杂时，常常采用这种专业化的建筑管理模式。特大型项目的组织特征总结为以下几点：

- 随着项目的进展，项目总体的组织方式将发生变化，即由“职能式”组织变化成“矩阵式”组织，再变到“项目式”组织(不一定严格按照这个顺序)。
- 在整个组织内部，可能出现职能式、项目式和矩阵式等嵌套组织共生的情况。这虽然对总成本的控制有利，但却使管理的理论和实践趋于复杂化。
- 成功的巨型复杂组织通常都有一个强矩阵嵌套组织，使得基本的成本和进度控制责任得以落实，这个嵌套组织被称为“成本中心”或被当作一个“项目”为某个项目经理所领导。成本中心矩阵里的参与者往往从各个不同职能部门分派而来。而这些职能部门则负责向组织内更高的层级提交技术报告。有效成本管理的关键在于依靠一个很强的项目经理的领导，把这个嵌套组织发展成一个精干的团队。
- 决策的集权或分权程度对特大型项目组织而言至关重要。

总之，认识到组织机构在项目进行到不同阶段，其组织形式会发生改变是十分重要的。

业主—建造运营模式

在这种模式里，业主为了维持一个用于内部运营的、庞大的劳动力，必须有一个稳定

的在建项目流。然而，即使业主为整合项目进展中的所有工作而保留集权式决策，他仍然可以将设计和建造的实质性部分外包给咨询师和承包商。

例 1.1　美国陆军工程公司组织。

美国陆军工程公司的地区工程师办公室可被认作是业主－建造运营模式的典型例子，如图 1.3 所示。

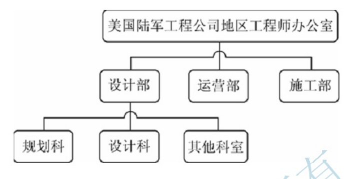


图 1.3　美国陆军工程公司的地区机构组织

在美国陆军工程公司的地区工程师办公室，通常有一个设计部和运营部，如果是一个大的地区，还会有一个施工部。每一个部门下设有若干个科室。由于项目通常经由美国国会发起和授权，所以为了便于操作，规划和设计通常分开进行。另外，由于项目可行性研究的授权通常比项目设计的授权要早几年，所以每一个阶段最好由设计部下面的不同科室来运作。如果项目的施工方案最终被批准，那么就由施工部门或外部的承包商来负责项目的施工。运营部则负责项目日常经营及各类设施的维修与养护。

当项目被批准后，应从最为合适的部门科室选择一位项目经理来领导项目，并连同从其他科室挑选出的人员一道组成项目团队。而当项目完成后，包括项目经理在内的所有项目团队成员都回归到其原来所在科室的岗位上，直到有新的项目任务。因此，该模式的项目管理采用矩阵式组织。

交钥匙运作模式

在交钥匙项目当中，由业主所选定的承包商来承担设计和施工的所有责任。承包商在业主提供执行标准的基础上，向业主提交完工建筑设施。如果业主愿意，承包商还可承担运营项目的责任。要想使交钥匙项目成功进行，业主需向承包商提供一套毫无歧义的执行标准，同时还应给予承包商完成项目的能力以足够的信任。

这种模式和前面所讲的业主—建造运营模式正好相反，在那里业主对设计—施工过程具有最大限度的控制权。

例 1.2　一个交钥匙组织范例。

1985 年，德克萨斯州的德克萨斯—新墨西哥电力公司推出一个采用交钥匙运作模式的 150MW 的电厂项目。征得德克萨斯州公用事业委员会的批准后，一个由 H.B.萨奇股份公司、威斯汀豪斯电力股份公司和克姆伯瑟工程有限公司组成的财团负责对该项目进行设计、施工和项目融资。该项目欲在 1990 年完工，其预计建设成本按 1990 年价格的可比价格为 2 亿美元。由于财团要承担包括贷款成本在内的建设期的所有债务，所以降低了对于贷款人、股东和公用事业管理公司的成本增加的风险。

项目团队领导和激励

项目经理，从这个术语的广义含义而言，是项目成败得失的关键。项目经理对项目的规划、组织和控制负有责任。反过来，项目经理拥有由管理组织授予的调动各项资源用以完成项目的权力。

为了领导项目团队，项目经理应施加其个人影响力。项目经理通过运用以下方法来获得团队成员的支持：

- 通过正式授权而得到发布指令的权力。
- 组织授予的根据个人表现对其实施直接或间接奖励或惩罚的权力。
- 当项目经理具备处理某项工作的专业知识和技能时的专家发言权。
- 项目经理本身具备的说服他人的能力。

在矩阵式组织当中，来自各职能部门的项目成员仍习惯于等级式结构里单线的汇报制度，这时项目经理应当协调这些选自不同职能部门的人员之间的活动。由于矩阵式组织中的职能部门仍会对影响项目进行的某些事情负责，所以在职能部门和项目团队之间就会有潜在冲突。为了使既定的项目方针和质量标准不受损害，则应当给予项目经理解决冲突的责任和权力。如果矛盾冲突有升级的趋势，则应立即引起高层管理的注意并予以及时化解。

一般而言，项目经理的权责不仅应当明确地予以定义，而且还应当予以确认，尤其是在矩阵式组织里。因为职能部门的经理们通常对其部门被暂时分派到项目上的人员仍保持着一定的影响力，所以应当遵守下面一些规则：

- 项目经理和职能部门经理之间的界面越简单越好。
- 当项目要素和职能部门发生重叠时，项目经理必须拥有对这些要素的控制权。
- 面对问题，项目经理必须采取积极解决的态度，而不是消极观望和无所适从。

Unit 2　The Employer

Right of Access to the Site

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Particular Conditions. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Employer's Requirements. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If no such time is stated in the Particular Conditions, the Employer shall give the Contractor right of access to, and possession of, the Site with effect from the Commencement Date.

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(1) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion].

(2) payment of any such Cost plus reasonable profit, which shall be added to the Contract Price.

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, cost or profit.

Permits, Licences or Approves

The Employer shall (where he is in a position to do so) provide reasonable assistance to the Contractor at the request of the Contractor:

(1) by obtaining copies of the Laws of the Country which are relevant to the Contract but are not readily available.

(2) for the Contractor's applications for any permits, licences or approvals required by the Laws of the Country:

① which the Contractor is required to obtain under Sub-Clause 1.13 [Compliance with Laws].

② for the delivery of goods, including clearance through customs.

③ for the export of Contractor's Equipment when it is removed from the Site.

Employer's personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site:

(1) co-operate with the Contractor's efforts under Sub-Clause 4.6 [Co-operation].

(2) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.18 [protection of the Environment].

Employer's Financial Arrangements

The Employer shall submit, within 28 days after receiving any request from the Contractor, reasonable evidence that financial arrangements have been made and are being maintained which will enable the Employer to pay the Contract Price (as estimated at that time) in accordance with Clause 14 [Contract Price and Payment]. If the Employer intends to make any material change to his financial arrangements, the Employer shall give notice to the Contractor with detailed particulars.

Employer's Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, he shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Employer's Equipment and Free-Issue Material], or for other services requested by the Contractor.

The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The employer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of the Defects Notification Period].

The Employer may deduct this amount from any moneys due, or to become due, to the Contractor. The Employer shall only be entitled to set off against or make any deduction from an amount due to the Contractor, or to otherwise claim against the Contractor, in accordance with this Sub-Clause or with sub-paragraph (a) and/or (b) of Sub-Clause 14.6 [Interim Payments].

The Employer's Representative

The Employer may appoint an Employer's Representative to act on his behalf under the Contract. In this event, he shall give notice to the Contractor of the name, address, duties and authority of the Employer's Representative.

The Employer's Representative shall carry out the duties assigned to him, and shall exercise the authority delegated to him, by the Employer. Unless and until the Employer notifies the Contractor, otherwise, the Employer's Representative shall be deemed to have the full authority of the Employer under the Contract, except in respect of Clause 15 [Determination by Employer].

If the Employer wishes to replace any person appointed as Employer's Representative, the Employer shall give the Contractor not less than 14 days' notice of the replacement's name, address, duties and authority, and of the date of appointment.

The Employer's personnel

The Employer or the Employer's Representative may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall not take effect until a copy of it has been received by the Contractor.

Assistant shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in Sub-Clause 1.4[Law and Language].

Delegated Persons

All these persons, including the Employer's Representative and assistants, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by a delegated person, in accordance with the delegation, shall have the same effect as though the act had been an act of the Employer. However:

(1) unless otherwise stated in the delegated person's communication relating to such act, it shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

(2) any failure to disapprove any work, Plant or Materials shall not constitute approval and shall therefore not prejudice the right of the Employer to reject the work, Plant or Materials.

(3) if the Contractor questions any determination or instruction of a delegated person, the Contractor may refer the matter to the Employer, who shall promptly confirm, reverse or vary the determination or instruction.

Instructions

The Employer may issue to the Contractor instructions which may be necessary for the Contractor to perform his obligations under the Contract. Each instruction shall be given in writing and shall state the obligations to which it relates and the Sub-Clause (or other term of the Contract) in which the obligations are specified. If any such instruction constitutes a variation, Clause 13 [Variations and Adjustments] shall apply.

The Contractor shall take instructions from the Employer, or from the Employer's

Representative or an assistant to whom the appropriate authority has been delegated under this Clause.

Determinations

Whenever these Conditions provide that the Employer shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Employer shall consult with the Contractor in an endeavour to reach agreement. If agreement is not achieved, the Employer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

The Employer shall give notice to the Contractor of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination, unless the Contractor gives notice, to the Employer, of his dissatisfaction with a determination within 14 days of receiving it. Either Party may then refer the dispute to the DAB in accordance with Sub-Clause 20.4 [Obtaining Dispute Adjudication Board's Decision].

Questions

1. When shall the employer give the contractor right of access to, and possession of, all parts of the site?
2. If the employer's failure was caused by any error or delay by the contractor, shall the contractor be entitled to extension of time, cost or profit?
3. What reasonable assistance should the employer provide to the contractor at the request of the contractor?
4. If the employer intends to make any material change to his financial arrangement, shall the employer notice to the contractor with detailed particulars?
5. When shall a notice relating to any extension of the defects notification period be given to the contractor?
6. What's authority of the employer's representative?
7. Who are included in the "delegated persons"?
8. Can delegated person issue instructions to the contractor?
9. The employer may issue to the contractor instructions, what shall the instructions state?
10. Once the contractor gives notices to the employer of his dissatisfaction with a determination, what will either party do?

Vocabulary, Phrases and Expressions

employer：雇主；业主
site：现场
right of access to the site：进入现场的权利
possession of the site：占用现场

the employer's requirements：雇主要求
performance security：履约担保
commencement date：开工日期
time for completion：竣工时间
an extension of time：延长期
contract price：合同价格
permits, licences or approvals：许可、执照或批准
protection of the environment：环境保护
financial arrangements：资金安排
material change to financial arrangements：重要的财务变更
defects notification period：缺陷通知期限
free-issue material：免费供应材料
employer's representative：雇主代表
resident engineer：驻地工程师
independent inspectors：独立检查员
delegated persons：受托人员
errors, omissions, or discrepancies：错误，遗漏或误差
dispute：争端

参 考 译 文

第 2 单元　雇　　主

现场进入权

雇主应在专用条件中规定的时间(或几个时间)内，给承包商进入和占用现场各部分的权利。进入和占用权可不为承包商独享。如果根据合同，要求雇主(向承包商)提供任何基础、结构、生产设备或进入手段的占用权，雇主应按雇主要求中规定的时间和方式提供。但雇主在收到履约担保前，可保留上述任何进入或占用权，暂不给予。

如果在专用条件中没有规定上述时间，雇主应自开工日期起给承包商进入和占用现场的权利。

如果雇主未能及时给承包商上述进入和占用的权利，使承包商遭受延误和(或)成本增加，承包商应向雇主发出通知，根据第 20.1 款[承包商的索赔]的规定有权要求：

(1) 根据第 8.4 款[竣工时间的延长]的规定，如果竣工已经或将受到延误，对任何此类延误，给予延长期。

(2) 任何此类费用和合理利润应加入合同价格，给予支付。

在收到此通知后，雇主应按照第 3.5 款[确定]的规定，就此项要求做出商定或确定。

但是，如果出现雇主的违约是由于承包商的任何错误或延误，包括在任何承包商文件中的错误或提交延误造成的情况，承包商无权得到上述延长期、费用或利润。

许可、执照或批准

雇主应(按其所能)根据承包商的请求对其提供以下合理的协助。

(1) 取得与合同有关但不易得到的工程所在国的法律文本。

(2) 协助承包商申办工程所在国法律要求的任何许可、执照或批准：

① 根据第 1.13 款[遵守法律]的规定，承包商需要得到的。

② 为运送货物，包括结关需要的。

③ 当承包商设备运离现场出口时需要的。

雇主人员

雇主应负责保证在现场的雇主人员和其他承包商做到：

(1) 根据第 4.6 款[合作]的规定，与承包商进行合作。

(2) 采取与根据第 4.8 款[安全程序](a)、(b)、(c)项和第 4.18 款[环境保护]要求承包商应采取的类似的行动。

雇主的资金安排

雇主应在收到承包商的任何要求的 28 天内提出其已做并将维持的资金安排的合理证明，说明雇主能够按照第 14 条[合同价格和付款]的规定，支付合同价格(按当时估算)。如果雇主拟对其资金安排做任何重要变更，应将其变更的详细情节通知承包商。

雇主的索赔

如果雇主认为，根据本条件的任何条款或合同有关的其他事项，他有权得到任何付款，和(或)缺陷通知期限的任何延长，他应向承包商发出通知，说明细节。但对承包商根据第 4.19 款[电、水和燃气]和第 4.20 款[雇主的设备和免费供应的材料]规定的到期付款，或承包商要求的其他服务的应付款，不需发出通知。

通知应在雇主了解引起索赔的事件或情况后尽快发出。关于缺陷通知缺陷任何延长的通知，应在该期限到期前发出。

通知的细节应说明提出索赔根据的条款或其他依据，还应包括雇主认为根据合同他有权得到的索赔金额和(或)延长期的事实依据。然后，雇主应按照第 3.5 款[确定]的要求，商定或确定雇主有权得到承包商支付的金额(如果有)和(或)按照第 11.3 款[缺陷通知期限的延长]的规定，得到缺陷通知期限的延长期(如果有)。

雇主可将上述金额在给承包商的到期或将到期的任何应付款中扣减。雇主应仅有权根据本款或第 14.6 款[期中付款](a)和(或)(b)项的规定，从给承包商的应付款中冲销或扣减，或另外对承包商提出索赔。

雇主代表

雇主可以任命一名雇主代表，代表他按照合同内容工作。在此情况下，他应将雇主代表的姓名、地址、任务和权利通知承包商。

雇主代表应完成指派给他的任务，履行雇主托付给他的权利。除非和直到雇主另行通知承包商，雇主代表将被认为具有雇主根据合同规定的全部权力，涉及第 15 条[由雇主终止]规定的权利除外。

如果雇主希望替换任何已任命的雇主代表，应在不少于 14 天前将替换人的姓名、地址、任务和权利以及任命的日期通知给承包商。

其他雇主人员

雇主或雇主代表可随时对一些助手指派和托付一定的任务和权力，也可撤销这些指派和托付。这些助手可包括驻地工程师和(或)担任检验、和(或)试验各项生产设备和(或)材料的独立检查员。以上指派、托付或撤销在承包商收到抄件后生效。

这些助手应具有适当的资质、履行其任务和权利的能力，并能流利地使用第 1.4 款[法律和语言]规定的交流语言。

受托人员

所有这些人员包括已被指派任务、托付权力的雇主代表和助手，应只被授权在托付规定的范围内向承包商发布指示。由受托人员根据托付做出的任何批准、校核、证明、同意、检查、检验、指示、通知、建议、要求、试验或类似行动，应如同雇主采取的行动一样有效，但：

(1) 除非在受托人员关于上述行动的信函中另有说明，该行动都不免除承包商根据合同应承担的任何职责，包括对错误、遗漏、误差和未遵办的职责。

(2) 未对任何工作、生产设备或材料提出否定意见不应构成批准，不应影响雇主拒绝该工作、生产设备或材料的权利。

(3) 如果承包商对受托人员的决定或指示提出质疑，承包商可将此事项提交给雇主，雇主应迅速对该决定或指示进行确认、取消或更改。

指示

雇主可向承包商发出为承包商根据合同履行义务所需要的指示。每项指示都应是书面的，并说明其有关的义务，以及规定这些义务的条款(或合同的其他条款)。当任何此类指示构成一项变更时，应按照第 13 条［变更和调整］的规定办理。

承包商应接受雇主、雇主代表或根据本条受托相应权力的雇主代表或助手的指示。

确定

每当本条件规定雇主应按照第 3.5 款对任何事项进行商定或确定时，雇主应与承包商协商尽量达成协议。如果达不成协议，雇主应对有关情况给予应有的考虑，按照合同做出公正的决定。

雇主应将每一项商定或决定连同依据的细节通知承包商。各方都应履行每项商定或决定，除非承包商在收到通知 14 天内向雇主发出通知，对某项决定表示不满。这时，任一方可依照第 20.4 款［取得争端裁决委员会决定］的规定，将争端提交 DAB。

Unit 3 Cost Estimation

Costs Associated with Constructed Facilities

The costs of a constructed facility to the owner include both the initial capital cost and the subsequent operation and maintenance costs. Each of these major cost categories consists of a number of cost components.

The capital cost for a construction project includes the expenses related to the initial establishment of the facility:

- Land acquisition, including holding and improvement.
- Planning and feasibility studies.
- Architectural and engineering design.
- Construction, including materials, equipment and labor.
- Field supervision of construction.
- Construction financing.
- Insurance and taxes during construction.
- Owner's general office overhead.
- Equipment and furnishings not included in construction.
- Inspection and testing.

The operation and maintenance cost in subsequent years over the project life cycle includes the following expenses:

- Land rent, if applicable.
- Operating staff.
- Labor and material for maintenance and repairs.
- Periodic renovations.
- Insurance and taxes.
- Financing costs.
- Utilities.
- Owner's other expenses.

The magnitude of each of these cost components depends on the nature, size and location of the project as well as the management organization, among many considerations. The owner is interested in achieving the lowest possible overall project cost that is consistent with its investment objectives.

It is important for design professionals and construction managers to realize that while the construction cost may be the single largest component of the capital cost, other cost components are not insignificant. For example, land acquisition costs are a major expenditure for building

construction in high-density urban areas, and construction financing costs can reach the same order of magnitude as the construction cost in large projects such as the construction of nuclear power plants.

From the owner's perspective, it is equally important to estimate the corresponding operation and maintenance cost of each alternative for a proposed facility in order to analyze the life cycle costs. The large expenditures needed for facility maintenance, especially for publicly owned infrastructure, are reminders of the neglect in the past to consider fully the implications of operation and maintenance cost in the design stage.

In most construction budgets, there is an allowance for contingencies or unexpected costs occurring during construction. This contingency amount may be included within each cost item or be included in a single category of construction contingency. The amount of contingency is based on historical experience and the expected difficulty of a particular construction project. For example, one construction firm makes estimates of the expected cost in five different areas:

- Design development changes.
- Schedule adjustments.
- General administration changes (such as wage rates).
- Differing site conditions for those expected.
- Third party requirements imposed during construction, such as new permits.

Contingent amounts not spent for construction can be released near the end of construction to the owner or to add additional project elements.

Approaches to Cost Estimation

Cost estimating is one of the most important steps in project management. A cost estimate establishes the base line of the project cost at different stages of development of the project. A cost estimate at a given stage of project development represents a prediction provided by the cost engineer or estimator on the basis of available data. According to the American Association of Cost Engineers, cost engineering is defined as that area of engineering practice where engineering judgment and experience are utilized in the application of scientific principles and techniques to the problem of cost estimation, cost control and profitability.

Virtually all cost estimation is performed according to one or some combination of the following basic approaches.

(1) Production function. In microeconomics, the relationship between the output of a process and the necessary resources is referred to as the production function. In construction, the production function may be expressed by the relationship between the volume of construction and a factor of production such as labor or capital. A production function relates the amount or volume of output to the various inputs of labor, material and equipment. For example, the amount of output Q may be derived as a function of various input factors x_1, x_2,$\cdots$, x_n by means of mathematical and/or statistical methods. Thus, for a specified level of output, we may attempt to find a set of values for the input factors so as to minimize the production cost. The relationship

between the sizes of a building project (expressed in square feet) to the input labor (expressed in labor hours per square foot) is an example of a production function for construction.

(2) Empirical cost inference. Empirical estimation of cost functions requires statistical techniques which relate the cost of constructing or operating a facility to a few important characteristics or attributes of the system. The role of statistical inference is to estimate the best parameter values or constants in an assumed cost function. Usually, this is accomplished by means of regression analysis techniques.

(3) Unit costs for bill of quantities. A unit cost is assigned to each of the facility components or tasks as represented by the bill of quantities. The total cost is the summation of the products of the quantities multiplied by the corresponding unit costs. The unit cost method is straightforward in principle but quite laborious in application. The initial step is to break down or disaggregate a process into a number of tasks. Collectively, these tasks must be completed for the construction of a facility. Once these tasks are defined and quantities representing these tasks are assessed, a unit cost is assigned to each and then the total cost is determined by summing the costs incurred in each task. The level of detail in decomposing into tasks will vary considerably from one estimate to another.

(4) Allocation of joint costs. Allocations of cost from existing accounts may be used to develop a cost function of an operation. The basic idea in this method is that each expenditure item can be assigned to particular characteristics of the operation. Ideally, the allocation of joint costs should be causally related to the category of basic costs in an allocation process. In many instances, however, a causal relationship between the allocation factor and the cost item cannot be identified or may not exist. For example, in construction projects, the accounts for basic costs may be classified according to:

- labor.
- material.
- construction equipment.
- construction supervision.
- general office overhead.

These basic costs may then be allocated proportionally to various tasks which are subdivisions of a project.

Types of Construction Cost Estimates

Construction cost constitutes only a fraction, though a substantial fraction, of the total project cost. However, it is the part of the cost under the control of the construction project manager. The required levels of accuracy of construction cost estimates vary at different stages of project development, ranging from ball park figures in the early stage to fairly reliable figures for budget control prior to construction. Since design decisions made at the beginning stage of a project life cycle are more tentative than those made at a later stage, the cost estimates made at the earlier stage are expected to be less accurate. Generally, the accuracy of a cost estimate will

reflect the information available at the time of estimation.

Construction cost estimates may be viewed from different perspectives because of different institutional requirements. In spite of the many types of cost estimates used at different stages of a project, cost estimates can best be classified into three major categories according to their functions. A construction cost estimate serves one of the three basic functions: design, bid and control. For establishing the financing of a project, either a design estimate or a bid estimate is used.

- Design Estimates

For the owner or its designated design professionals, the types of cost estimates encountered run parallel with the planning and design as follows:

(1) Screening estimates (or order of magnitude estimates).

(2) Preliminary estimates (or conceptual estimates).

(3) Detailed estimates (or definitive estimates).

(4) Engineer's estimates based on plans and specifications.

For each of these different estimates, the amount of design information available typically increases.

In the planning and design stages of a project, various design estimates reflect the progress of the design. At the very early stage, the screening estimate or order of magnitude estimate is usually made before the facility is designed, and must therefore rely on the cost data of similar facilities built in the past. A preliminary estimate or conceptual estimate is based on the conceptual design of the facility at the state when the basic technologies for the design are known. The detailed estimate or definitive estimate is made when the scope of work is clearly defined and the detailed design is in progress so that the essential features of the facility are identifiable. The engineer's estimate is based on the completed plans and specifications when they are ready for the owner to solicit bids from construction contractors. In preparing these estimates, the design professional will include expected amounts for contractors' overhead and profits.

The costs associated with a facility may be decomposed into a hierarchy of levels that are appropriate for the purpose of cost estimation. The level of detail in decomposing the facility into tasks depends on the type of cost estimate to be prepared. For conceptual estimates, for example, the level of detail in defining tasks is quite coarse; for detailed estimates, the level of detail can be quite fine.

As an example, consider the cost estimates for a proposed bridge across a river. A screening estimate is made for each of the potential alternatives, such as a tied arch bridge or a cantilever truss bridge. As the bridge type is selected, e.g. the technology is chosen to be a tied arch bridge instead of some new bridge form; a preliminary estimate is made on the basis of the layout of the selected bridge form on the basis of the preliminary or conceptual design. When the detailed design has progressed to a point when the essential details are known, a detailed estimate is made on the basis of the well defined scope of the project. When the detailed plans and specifications are completed, an engineer's estimate can be made on the basis of items and quantities of work.

- Bid Estimates

For the contractor, a bid estimate submitted to the owner either for competitive bidding or negotiation consists of direct construction cost including field supervision, plus a markup to cover general overhead and profits. The direct cost of construction for bid estimates is usually derived from a combination of the following approaches.

(1) Subcontractor quotations.

(2) Quantity takeoffs.

(3) Construction procedures.

The contractor's bid estimates often reflect the desire of the contractor to secure the job as well as the estimating tools at its disposal. Some contractors have well established cost estimating procedures while others do not. Since only the lowest bidder will be the winner of the contract in most bidding contests, any effort devoted to cost estimating is a loss to the contractor who is not a successful bidder. Consequently, the contractor may put in the least amount of possible effort for making a cost estimate if it believes that its chance of success is not high.

If a general contractor intends to use subcontractors in the construction of a facility, it may solicit price quotations for various tasks to be subcontracted to specialty subcontractors. Thus, the general subcontractor will shift the burden of cost estimating to subcontractors. If all or part of the construction is to be undertaken by the general contractor, a bid estimate may be prepared on the basis of the quantity takeoffs from the plans provided by the owner or on the basis of the construction procedures devised by the contractor for implementing the project. For example, the cost of a footing of a certain type and size may be found in commercial publications on cost data which can be used to facilitate cost estimates from quantity takeoffs. However, the contractor may want to assess the actual cost of construction by considering the actual construction procedures to be used and the associated costs if the project is deemed to be different from typical designs. Hence, items such as labor, material and equipment needed to perform various tasks may be used as parameters for the cost estimates.

- Control Estimates

For monitoring the project during construction, a control estimate is derived from available information to establish:

(1) Budget estimate for financing.

(2) Budgeted cost after contracting but prior to construction.

(3) Estimated cost to completion during the progress of construction.

Both the owner and the contractor must adopt some base line for cost control during the construction. For the owner, a budget estimate must be adopted early enough for planning long term financing of the facility. Consequently, the detailed estimate is often used as the budget estimate since it is sufficient definitive to reflect the project scope and is available long before the engineer's estimate. As the work progresses, the budgeted cost must be revised periodically to reflect the estimated cost to completion. A revised estimated cost is necessary either because of change orders initiated by the owner or due to unexpected cost overruns or savings.

For the contractor, the bid estimate is usually regarded as the budget estimate, which will be used for control purposes as well as for planning construction financing. The budgeted cost should also be updated periodically to reflect the estimated cost to completion as well as to insure adequate cash flows for the completion of the project.

Questions

1. Which expenses are included in the capital cost for a construction project?
2. Which expenses are included in the operation and maintenance cost in subsequent years over the project life cycle?
3. Which cost may be the single largest component of the capital cost? Are the other cost components insignificant?
4. How does the construction firm estimate the amount of contingency?
5. Why is a cost estimate important at different stages of development of the project?
6. Say about the required levels of accuracy of construction cost estimates vary at different stages of project development.
7. How to classify cost estimates according to their functions?
8. For the owner or its designated design professionals, what types of cost estimates encountered run parallel with the planning and design?
9. How does a general contractor prepare a bid estimate?
10. How do the owner and the contractor control estimate?

Vocabulary, Phrases and Expressions

cost estimation：成本估算
initial capital：创办成本；初始投资
operation and maintenance costs：运行与养护费用
land acquisition：土地获得
field supervision of construction：现场施工监督
overhead：企业一般管理费用
project life cycle：项目生命周期
land rent：土地租金
periodic renovations：周期性更新
financial costs：财务成本
construction cost：施工建设费
unexpected costs：不可预见费用
cost engineers：造价工程师
cost engineering：工程估价
cost control：成本控制

production function：产出函数
the amount or volume of output：产出总量
production cost：生产成本
empirical cost inference：经验成本推论
bill of quantities：工程量清单
unit cost：单位成本
joint costs：联合成本
accuracy of cost estimates：估价精度
design estimate：设计估价
bid estimate：投标估价
screening estimates(or order of magnitude estimates)：筛选估计；匡算(或数量级估计)
preliminary estimates (or conceptual estimates)：初步估算(或概念性估算)
detailed estimates (or definitive estimates)：详细估计(或确定估计)
direct construction cost：直接施工成本
profits：利润
control estimate：控制估价
budget estimate：财务预算

参 考 译 文

第 3 单元　成 本 估 算

与建筑设施相关的成本

对业主来说，一项建筑设施的成本包括初始投资和随后的运行与养护费用。这两大项费用又是由许多分项费用组成的。

对于一个建设项目，其初始投资包括与建设该设施相关的各项资本投入：

- 取得土地，包括持有和再开发。
- 规划和可行性研究。
- 建筑和工程设计。
- 施工，包括材料、设备和劳动力。
- 现场施工监督。
- 建设融资成本。
- 建设过程中的各种保险和税费。
- 业主的一般行政管理开支。
- 不包括在施工中的设备和家具。
- 检查和试验。

在项目建成后全寿命周期中的运行与维护费用包括以下几个方面：

- 土地租金(如果有的话)。

- 运行人员费用。
- 维修和保养的劳动力和材料费用。
- 周期性翻新费用。
- 保险和税费。
- 财务成本。
- 公用事业费。
- 业主的其他开支。

以上这些费用的多少要由项目的性质、规模和地理位置，以及管理组织等多方面的因素来决定。业主总希望以尽可能少的投入来实现项目的目标。

设计者和施工管理者应当非常明确的重要一点是，施工建设费用是成本中最主要的一项费用，但是其他费用也不可忽视。例如，在高密度建筑的市区建设一个项目，取得土地的费用是一项主要的成本，而对核电站等这样的大型项目建设，融资成本可能与项目的建造成本基本持平。

站在业主方的角度看，为了分析项目全寿命周期的成本，对每个建设方案的运行和维护成本进行估计是同样重要的。有些项目，尤其是公共项目的物业保养成本巨大，这时刻都在提醒我们，不该像过去那样在项目的设计阶段忽视项目建成后的运行和保养。

在很多项目的预算中，总有一部分不可预见的费用准备用于施工中的意外情况，这些不可预见费用有可能包含在每一项费用中，也可能作为一项总的不可预见费用。不可预见费用的多少可根据历史经验和特定项目的建设难度来估计。例如，某一建筑公司对不可预见费用的估算包括 5 个不同方面。

- 设计变更。
- 进度调整。
- 总体管理方面的变化(例如，工资水平的变化)。
- 预测的现场条件的不同。
- 建设过程中第三方要求所产生的费用，如新的许可要求。

没有用掉的不可预见费用在工程末期可以退回业主方，或者用于项目新增部分的建设。

成本估算的方法

成本估算是项目管理中最重要的环节之一。它在项目建设的不同阶段为项目的成本建立了一条基准线。在项目开发过程中的某一特定阶段的成本估算就是造价工程师在现有数据基础上对未来成本的预测。根据美国造价工程师协会的定义，工程估价是运用科学理论和技术，根据工程师的判断和经验，解决成本估算、成本控制和盈利能力等问题的活动。

实际上，所有的估价活动都是基于以下这些基本方法中的一种或几种方法的组合。

(1) 产出函数。在微观经济学中把过程的产出和资源的消耗这两者之间的关系叫做产出函数。在建筑工程中，产出函数则可认为是建设项目的规模和生产参数(如人工或资金)之间的关系。产出函数建立了产出的总量或规模与各种投入(比如人力、材料、设备)之间的关系。例如，代表产出的 Q 可以用代表各种投入的不同参数 $x_1, x_2, \cdots, x_n$ 等通过数学和/或统计方法表达。因此，对某一特定的产出，可以通过对各个投入参数赋予不同的值，从而找到一个最低的生产成本。房屋建筑的大小(用平方英尺表示)和消耗的人力(用小时/平方英尺来表示)之间的关系就是产出函数的一个例子。

(2) 经验成本推论法。利用基于经验的成本函数估算成本需要一些统计技术，这些技术将建造或运营某设施与系统的一些重要特征或属性联系起来。数理统计推理的目的是为了找到最适合的参数值或者常数，用于在假定的成本函数中进行成本估算。在通常情况下，这需要利用回归分析法。

(3) 用于工程量清单的单位成本法。由工程量清单表达的各项任务或各个组成部分的单位成本能够明确，总成本就是各项产品的数量与其相应单位成本的乘积之和。单位成本法虽然在理论上非常直接，但是难以应用。第一步是将某工作分解成许多项任务，当然每项任务都是为项目建设服务的。一旦这些任务确定，并有了工作量的估算，用单价与每项任务的量相乘就可以得到每项任务的成本，从而得出每项工作的成本。当然，在不同的估算中对每项工作分解的详细程度可能会有很大差别。

(4) 混合成本分配法。有时候要从现有的会计账目上去分解，从而确定某项具体操作的成本函数。这种方法的基本思想是，每一项花费都能够对应地分配到操作过程中的某一特定步骤。理想情况是在成本分配过程中，混合成本能够有因果对应关系地被分解，并确定为某种基本成本。但是，在很多情况下，子项目和其分配成本之间难以确定或者根本不存在因果关系。例如，在建设项目中，基本成本可定义为以下 5 个方面：

- 人力。
- 材料。
- 建筑设备。
- 建设管理。
- 日常办公开销。

这几个基本成本有可能会按比例地分配到工程子项的不同任务中去。

建造成本估算的类型

建造成本是整个项目成本中的一部分，虽然很重要，但只是施工项目经理控制下的成本的一部分。在项目建设的不同阶段对估价精确度的要求也不一样，早期只是粗略估计，到施工前的预算就应当是相当可靠了。由于在项目生命周期早期设计方面的决策比后期更加具有不确定性，所以也就不能期望早期阶段的估价会准确。总的来说，估价的准确程度将反映估价时所获取的信息。

由于不同机构的要求不同，对建造成本估算也存在不同的观点。虽然在项目的不同阶段，建造成本的估算有许多不同的方法，但是根据其功用可分为 3 种主要方法。建造成本估算主要服务于以下 3 个方面：设计、投标和控制。要对项目进行融资，要么需要设计估价，要么需要投标估价。

- 设计估价

对于业主或他指定的设计者而言，在规划和设计过程中要平行进行的估价的种类如下：

(1) 匡算(宏观估价)。

(2) 初步估算(概念方案阶段估价)。

(3) 详细估算(明确估价)。

(4) 工程师基于施工计划和说明的估算。

对于以上每一个估价阶段，设计所提供的信息量是逐步增加的。

在项目的规划和设计阶段，不同的设计估算反映了设计进展的不同阶段。在最初阶段，投资匡算或者宏观估价通常是在项目设计之前做出的，因此必须依靠过去类似项目的数据。初步估算或者称为概念方案阶段估价主要基于概念设计方案进行估算，此时只明确了最基本的技术方案。详细估算或者称为明确估价是在工程范围基本明确、详细设计正在进行、项目的基本特征已经确定时做出的。工程师估算要以明确的施工计划和施工说明为基础，并且业主也可以据此发包选择施工承包商。在做这些估算时，设计人员应将承包商的日程管理费和利润考虑进去。

为了进行成本估算，可以把一项设施的有关成本分解成几个适当的层次。层次划分的详细程度取决于成本估算的种类，例如，对于概念设计方案阶段的估价，层次的划分就比较粗，而对于详细设计阶段的估价，层次的划分就应该很细。

例如，要对某条河上的拟建桥梁进行造价估算，投资匡算是对每个潜在的方案进行估算，如是采用拱桥方案还是悬臂桁架桥方案。当桥的类型确定后，比如选定拱形桥而不是其他形式的桥，这时就要基于拱形桥的平面布置，在初步或概念设计的基础上做初步估算。当详细设计进行到一定阶段，最根本的详细设计已经完成时，就要基于项目的明确范围进行详细估算。当完成了详细施工计划和施工指导说明后，就可以根据各项工作和其工程量进行工程师估算了。

● 投标估价

对于承包商来说，提交给业主的投标估价的目的是为竞争的需要或者是与业主谈判的需要，投标估价中包括直接施工成本(包括现场监督以及在此基础上增加一笔总体管理费)和利润。用于投标估价中的直接施工成本常用以下几种方法组合计算：

(1) 根据分包商的报价。

(2) 估计的工程量。

(3) 施工方案。

承包商的投标估价常常反映了承包商对完成投标工程的期望值，也反映了其所采用的估价工具。有些承包商拥有良好的估价程序，而有些则没有。由于在大多数工程招标中一般都是最低价中标，所以对于未中标者来说，在投标估价过程中的任何投入都是浪费。因此，如果一个承包商认为自己胜出的机会不是很大，他就会花费尽可能少的精力来进行成本估价。

如果一个总承包商在设施的建设过程中希望将工程进行分包，他有可能要求各个专业分包商提交分包报价单，所以总承包商将把成本估算的任务转移到分包商头上。如果所有的工程或部分工程由总承包商来施工，投标估计就要根据业主提出的计划和工程量或由承包商提供的施工组织计划来进行编制。例如，某类房屋某种基础的成本可以从某些商业出版物中找到其单价，再根据工程量就可以算出成本。但是，项目的实际情况可能导致实际施工程序与一般设计要求不同，在这种情况下承包商就要想办法估算其真实的成本和相关的费用。因此，为完成不同任务所需要的劳动力、材料和设备等就应该作为成本估算的参数。

● 控制估价

为在施工过程中进行管理和控制，需要基于以下信息编制一个控制性的估价：

(1) 财务预算。

(2) 签订合同后在开工前的预算。

(3) 在施工过程中所做的对完工前的成本估算。

在施工过程中，业主和承包商都会有一个成本的基准来控制实际成本。对业主来说，必须尽早明确预算(budget estimate)用于项目的长期财务规划。因而，在工程师估算完成前的相当长时间里，只能用详细估算来作为控制预算，因为详细估算也能充分明确地反映项目的范围。在工程进行的过程中，必须对成本估算进行定期更新，以反映完工前的预测成本。由于在施工中业主可能提出变更要求，或者有不可预见的突破成本或节约成本的情况发生，对成本估算进行及时更新是很必要的。

对承包商来说，经常用投标估价作为预算，既可以进行成本控制，也可以进行施工期间的财务规划。该预算成本也要定期更新，以反映完工前的预测成本，并确保项目完工前的现金投入。

Unit 4　The Project Budget(1)

For cost control on a project, the construction plan and the associated cash flow estimates can provide the baseline reference for subsequent project monitoring and control. For schedules, progress on individual activities can be compared with the project schedule to monitor the progress of activities. Contract and job specifications provide the criteria by which to assess and assure the required quality of construction. The final or detailed cost estimate provides a baseline for the assessment of financial performance during the project. To the extent that costs are within the detailed cost estimate, then the project is thought to be under financial control. Overruns in particular cost categories signal the possibility of problems and give an indication of exactly what problems are being encountered. Expense oriented construction planning and control focuses upon the categories included in the final cost estimation.

For control and monitoring purposes, the original detailed cost estimate is typically converted to a project budget, and the project budget is used subsequently as a guide for management. Specific items in the detailed cost estimate become job cost elements. Expenses incurred during the course of a project are recorded in specific job cost accounts to be compared with the original cost estimates in each category. Thus, individual job cost accounts generally represent the basic unit for cost control. Alternatively, job cost accounts may be disaggregated or divided into work elements which are related both to particular scheduled activities and to particular cost accounts.

In addition to cost amounts, information on material quantities and labor inputs within each job account is also typically retained in the project budget. With this information, actual materials usage and labor employed can be compared to the expected requirements. As a result, cost overruns or savings on particular items can be identified as due to changes in unit prices, labor productivity or in the amount of material consumed.

The number of cost accounts associated with a particular project can vary considerably. For constructors, on the order of four hundred separate cost accounts might be used on a small project. These accounts record all the transactions associated with a project. Thus, separate accounts might exist for different types of materials, equipment use, payroll, project office, etc. Both physical and non-physical resources are represented, including overhead items such as computer use or interest charges. Table 4-1 summarizes a typical set of cost accounts that might be used in building construction. Note that this set of accounts is organized hierarchically, with seven major divisions (accounts 201 to 207) and numerous subdivisions under each division. This hierarchical structure facilitates aggregation of costs into pre-defined categories; for example, costs associated with the superstructure (account 204) would be the sum of the underlying subdivisions (ie. 204.1, 204.2, etc.). The sub-division accounts in Table 4-1 could be further divided into personnel, material and other resource costs for the purpose of financial accounting.

Table 4-1 Illustrative Set of Project Cost Accounts

201	Clearing and Preparing Site
202	Substructure
202.1	Excavation and Shoring
202.2	Piling
202.3	Concrete Masonry
202.31	Mixing and Placing
202.32	Formwork
202.33	Reinforcing
203	Outside Utilities (water, gas, sewer, etc.)
204	Superstructure
204.1	Masonry Construction
204.2	Structural Steel
204.3	Wood Framing, Partitions, etc.
204.4	Exterior Finishes (brickwork, terra cotta, cut stone, etc.)
204.5	Roofing, Drains, Gutters, Flashing, etc.
204.6	Interior Finish and Trim
204.61	Finish Flooring, Stairs, Doors, Trim
204.62	Glass, Windows, Glazing
204.63	Marble, Tile, Terrazzo
204.64	Lathing and Plastering
204.65	Soundproofing and Insulation
204.66	Finish Hardware
204.67	Painting and Decorating
204.68	Waterproofing
204.69	Sprinklers and Fire Protection
204.7	Service Work
204.71	Electrical Work
204.72	Heating and Ventilating
204.73	Plumbing and Sewage
204.74	Air Conditioning
204.72	Fire Alarm, Telephone, Security, Miscellaneous
205	Paving, Curbs, Walks
206	Installed Equipment (elevators, revolving doors, mailchutes, etc.)
207	Fencing

In developing or implementing a system of cost accounts, an appropriate numbering or coding system is essential to facilitate communication of information and proper aggregation of

cost information. Particular cost accounts are used to indicate the expenditures associated with specific projects and to indicate the expenditures on particular items throughout an organization. These are examples of different perspectives on the same information, in which the same information may be summarized in different ways for specific purposes. Thus, more than one aggregation of the cost information and more than one application program can use a particular cost account. Separate identifiers of the type of cost account and the specific project must be provided for project cost accounts or for financial transactions. As a result, a standard set of cost codes such as the MASTERFORMAT codes may be adopted to identify cost accounts along with project identifiers and extensions to indicate organization or job specific needs. Similarly the use of databases or, at a minimum, inter-communicating applications programs facilitate access to cost information.

Converting a final cost estimate into a project budget compatible with an organization's cost accounts is not always a straightforward task. Cost estimates are generally disaggregated into appropriate functional or resource based project categories. For example, labor and material quantities might be included for each of several physical components of a project. For cost accounting purposes, labor and material quantities are aggregated by type no matter for which physical component they are employed. For example, particular types of workers or materials might be used on numerous different physical components of a facility. Moreover, the categories of cost accounts established within an organization may bear little resemblance to the quantities included in a final cost estimate. This is particularly true when final cost estimates are prepared in accordance with an external reporting requirement rather than in view of the existing cost accounts within an organization.

One particular problem in forming a project budget in terms of cost accounts is the treatment of contingency amounts. These allowances are included in project cost estimates to accommodate unforeseen events and the resulting costs. However, in advance of project completion, the source of contingency expenses is not known. Realistically, a budget accounting item for contingency allowance should be established whenever a contingency amount was included in the final cost estimate.

A second problem in forming a project budget is the treatment of inflation. Typically, final cost estimates are formed in terms of real dollars and an item reflecting inflation costs is added on as a percentage. This inflation allowance would then be allocated to individual cost items in relation to the actual expected inflation over the period for which costs will be incurred.

Example 4.1　Project Budget for a Design Office.

An example of a small project budget is shown in Table 4-2.

This budget might be used by a design firm for a specific design project. While this budget might represent all the work for this firm on the project, numerous other organizations would be involved with their own budgets. In Table 4-2, a summary budget is shown as well as a detailed listing of costs for individuals in the Engineering Division. For the purpose of consistency with cost accounts and managerial control, labor costs are aggregated into three groups: the

engineering, architectural and environmental divisions. The detailed budget shown in Table 4-2 applies only to the engineering division labor; other detailed budgets amounts for categories such as supplies and the other work divisions would also be prepared. Note that the salary costs associated with individuals are aggregated to obtain the total labor costs in the engineering group for the project. To perform this aggregation, some means of identifying individuals within organizational groups is required. Accompanying a budget of this nature, some estimate of the actual man-hours of labor required by project task would also be prepared. Finally, this budget might be used for internal purposes alone. In submitting financial bills and reports to the client, overhead and contingency amounts might be combined with the direct labor costs to establish an aggregate billing rate per hour.

Table 4-2 Example of a Small Project Budget for a Design Firm

Personnel	Budget Summary/dollar
Architectural Division	67 251.00
Engineering Division	45 372.00
Environmental Division	28 235.00
Total	140 858.00
Other Direct Expenses	
Travel	2 400.00
Supplies	1 500.00
Communication	600.00
Computer Services	1 200.00
Total	5 700.00
Overhead	175 869.60
Contingency and Profit	95 700.00
Total	418 127.60
Senior Engineer	
Associate Engineer	11 562.00
Engineer	21 365.00
Technician	12 654.00
Total	45 372.00

Example 4.2 Project Budget for a Constructor.

Table 4-3 illustrates a summary budget for a constructor. This budget is developed from a project to construct a wharf. As with the example design office budget above, costs are divided into direct and indirect expenses. Within direct costs, expenses are divided into material, subcontract, temporary work and machinery costs. This budget indicates aggregate amounts for the various categories. Cost details associated with particular cost accounts would supplement and support the aggregate budget shown in Table 4-3. A profit and a contingency amount might be added to the basic budget of $ 1 715 147 shown in Table 4-3 for completeness.

Table 4-3　An Example of a Project Budget for a Wharf Project

	Material Cost/$	Subcontract Work/$	Temporary Work/$	Machinery Cost/$	Total Cost/$
Steel Piling	292 172	129 178	16 389	0	437 739
Tie-rod	88 233	29 254	0	0	117 487
Anchor-Wall	130 281	60 873	0	0	191 154
Backfill	242 230	27 919	0	0	300 149
Coping	42 880	22 307	13 171	0	78 358
Dredging	0	111 650	0	0	111 650
Fender	48 996	10 344	0	1 750	61 090
Other	5 000	32 250	0	0	37 250
Sub-total	849 800	423 775	29 560	1 750	1 304 885
Summary					
Total of Direct Cost					$1 304 885
Indirect Cost					
Common Temporary Work					$19 320
Common Machinery					$80 934
Transportation					$15 550
Office Operating Costs					$294 458
Total of Indirect Cost					$ 410 262
Total Project Cost					$1 715 147

Questions

1. How is the original detailed cost estimate converted to a project budget?
2. What may job cost accounts be divided into?
3. In addition to cost amounts, what is also typically retained in the project budget?
4. List separate accounts that exist in different types.
5. What's the advantage of the hierarchical structure in cost accounts?
6. Converting a final cost estimate into a project budget compatible with an organization's cost accounts is not always a straightforward task, why?
7. How to treat the contingency amounts in forming a project budget in terms of cost accounts?
8. How to treat inflation in forming a project budget?
9. Say about the example of a small project budget for a design firm.
10. How is cost divided in the example of project budget for a contractor?

Vocabulary, Phrases and Expressions

project budget：项目预算
cost control：成本控制
cash flow：现金流量
job specifications：施工(工作)规范
financial performance：财务状况
overruns：超支
job cost elements：工作成本要素
work elements：作业要素
database：数据库
separate accounts：专账
contingency allowance：应急准备金
unforeseen events：不可预见事件
inflation allowance：通货膨胀准备金
a summary budget：汇总预算
financial bills：财务单据
direct labor costs：直接人工成本
indirect costs：间接成本
overhead and contingency amounts：企业管理费用和应急费用总计

参 考 译 文

第 4 单元 项目预算(1)

对于项目的成本控制、项目计划和相关的现金流量估算可以为后续的项目监督和控制提供参照基准。对于进度控制，可以将项目活动的实际进度和项目的计划进度进行比较，以监督项目的进度实施。合同和工作标准则为建设项目的质量提供了评价和保证准则。最终的或详细的成本预算为项目期的财务状况提供了评价基准。如果实际成本没有超出详细的成本估算，我们便认为项目的财务控制做得较好。特殊成本项次的超支发出了可能存在问题的信号，并且对所面临问题给出确切的指示。以费用为导向的建设项目计划和控制，侧重包含在最终成本估算内的成本项次。

本着控制和监督的目的，初始的详细成本估算通常被转化为项目预算，并被用来作为随后成本管理的指南。详细成本估算中的具体项次成为工作成本要素。在项目实施过程中所发生的支出被记录在具体的工作成本报告中，以用来在每一成本项次下和原始成本估算相比较。这样一来，个别的工作成本报告通常就被称为成本控制的基本单位。同时，工作成本报告还可分解成与具体的进度活动及具体的成本报告都有关的作业要素。

除了成本报告之外，项目预算中还应保留每项工作报告有关材料数量和劳动力投入的信息。有了这些信息，就可将实际的材料用量和人工消耗与预期的标准进行比较，这样就可以识别出具体活动成本超支或节约的原因，即是由于单价变化还是由于劳动生产率或材料消耗量上的变化所引起的。

一个具体项目上的成本报告数字差异很大。对于建设项目，一个小项目也可能有多达 400 多个独立的成本报告。这些报告记录了项目上的所有交易活动。因此，存在不同类型的专账，例如，有原材料报告、设备使用报告、工资报告、办公室报告等。同时，诸如计算机使用或利息支出之类的有形或无形的费用支出都要表示在报告当中。表 4-1 总结了一套用在建设项目上的成本报告。注意，这套报告被划分为 7 个主要部分(报告 201 到报告 207)，同时每部分又包括了大量子目。这种等级式的报告结构有利于把成本按预先确定好的类别进行汇总。例如，主体结构的成本(报告 204)是由其下的各子项目汇总而来的(即 204.1、204.2 等)。表 4-1 中的子目报告又可进一步被分解成人工、材料和其他资源成本，以方便财务会计工作。

表 4-1　项目成本报告说明

201	清理和准备现场
202	地下结构
202.1	钻孔和支护
202.2	打桩
202.3	混凝土浇筑
202.31	搅拌
202.32	成型
202.33	养护
203	场外设施(水、气、排污等)
204	主体结构
204.1	混凝土施工
204.2	钢筋工程
204.3	砌体工程
204.4	室外工程
204.5	屋面工程
204.6	室内装饰
204.61	楼地面
204.62	玻璃和窗户
204.63	大理石
204.64	板条抹灰
204.65	隔音与绝缘
204.66	五金
204.67	喷涂
204.68	防水

续表

204.69	消防
204.7	服务设施
204.71	电器照明
204.72	供热通风
204.73	管道与排污
204.74	空调工程
204.75	火警、电话、安全和其他
205	铺坡道地砖
206	设备安全(电梯、旋转门等)
207	围墙

在开发和运用成本报告系统时，适当的编码或译码体系有利于信息沟通和成本信息的汇总。特定的成本报告既可用来显示有关具体项目的费用，也可以显示组织中具体事项的开支，这就是相同的信息有不同角度应用的例子，即相同的信息因为特定的目的可以用不同的方法被计算和汇总。因而，一个成本报告可能被多个成本信息汇总应用程序所使用。具体项目中的项目成本报告或财务交易的每一类成本报告必须有独立的标识符。这样一来，就可以采用主格式编码这样一套标准成本编码，连同项目识别符来识别成本报告及显示组织或工作需求的工作范围。同样地，还可以通过使用数据库，或至少通过使用内部联络应用程序来进行成本信息的获取。

把最终的成本估算转化成与组织的成本报告兼容的项目预算并不是一项简单的工作。成本估算通常被分解到基于项目范畴的功能或资源上。例如，项目的任何一个实体分部都会包括人工或材料的消耗量，从成本会计的角度出发，在统计人工和材料的消耗量时，是按照其类型而不考虑其具体被使用在哪个实体分部上。也就是说，同一类型的人工或材料可能在建筑产品的许多实体分部上都被使用过。此外，建立在组织内部的成本报告种类同详细的成本估算中的数量很少有相似之处。当详细的成本估算是按照外部的汇报要求而不是按照组织内部现有的成本报告来编制时，其情况就更加如此。

在按照成本报告来形成项目预算时所面临的一个具体问题是如何对待意外事件。为了应付不可预见事件和由此产生的成本，通常在项目成本估算中要安排一定数量的储备金。然而，在项目完工前，应急储备金的动用与否是根据意外事件是否发生来确定的。在实际操作当中，无论详细的成本估算中是否包括了意外事件，项目预算都应列支一笔应急储备金。

在形成项目预算时遇到的第二个问题是如何对待通货膨胀。典型地，详细成本估算是按照美元现价来编制的，同时追加一个以百分比形式出现的反应通货膨胀成本的列项，即通常所说的通货膨胀准备金。这笔通货膨胀准备金根据通货膨胀的实际发生水平所引发的成本被分配至各个具体的成本项目上。

例 4.1　一个设计事务所的项目预算。

一个小的项目预算示例见表 4-2。这是一个为具体项目进行设计的设计公司的预算。尽管这个预算涵盖了这家设计公司在项目上的所有工作，然而其他的组织也应有其自己的项目预算。在表 4-2 当中，不但有一个汇总预算，同时还有一个设计部的人工费用明细表。

为了成本报告的连续性和便于管理上的控制，人工费按设计部、建筑部和环境部 3 个部门来进行汇总。表 4-2 中只列出了设计部的详细预算，而后勤等其他部门的详细预算理应同时列出，此表省略了。在设计部，总的劳动力成本是由为项目工作的所有人员的工资累加而得到的。为了完成这项工作，需要一些区分组织内部不同人员工资及绩效考评的方法，而通常我们会按项目各任务所需实际工时的估算来进行这项工作。最后，这个预算只能为组织内部的特定目标服务。在向客户提交财务单据和报告时，管理费和应急费在直接劳动力成本的基础上，以固定百分比汇总累加的形式出现。

表 4-2　一个设计事务所的项目预算示例

分类	预算汇总/美元
人员所在部门	
建筑学	67 251.00
设计部	45 372.00
环境部	28 235.00
合计	140 858.00
其他直接费用	
差旅	2 400.00
后勤	1 500.00
通信	600.00
计算机服务	1 200.00
合计	5 700.00
管理费	175 869.60
应急费与利润	95 700.00
合计	418 127.60
工程部人员明细	
高级工程师	11 562.00
工程师	21 365.00
技术人员	12 654.00
合计	45 372.00

例 4.2　一个承包商的项目预算。

表 4-3 显示了一个承包商的简单项目的预算。该项目为一个承建码头施工的项目。和前面的例子一样，这里把成本也分为直接成本和间接成本两种。在直接成本里面，又将支出划分为材料费、合同分包费、临时工作费和机械费。这个预算是按不同的项次来汇总的。具体成本报告中的成本数据可以对表 4-3 所示的汇总预算进行补充和支持。完工利润和应急费可在表 4-3 中 1 715 147 美元的基本预算上另行计算。

表 4-3 某码头项目预算示例

	材料费/$	合同分包费/$	暂定工作费/$	机械费/$	单项汇总/$
钢桩	292 172	129 178	16 389	0	437 739
连接杆	88 233	29 254	0	0	117 487
锚定墙	130 281	60 873	0	0	191 154
回填	242 230	27 919	0	0	300 149
压顶	42 880	22 307	13 171	0	78 358
疏浚	0	111 650	0	0	111 650
挡泥板	48 996	10 344	0	1 750	61 090
其他	5 000	32 250	0	0	37 250
分项汇总	849 800	423 775	29 560	1 750	1 304 885
			总计		
			总直接成本		$1 304 885
			间接成本		
			共用暂定工作		$19 320
			公用机械		$80 934
			交通运输		$15 550
			办公费用		$294 458
			总间接成本		$410 262
			总项目成本		$1 715 147

Unit 5 The Project Budget(2)——Forecasting for Activity Cost Control

For the purpose of project management and control, it is not sufficient to consider only the past record of costs and revenues incurred in a project. Good managers should focus upon future revenues, future costs and technical problems. For this purpose, traditional financial accounting schemes are not adequate to reflect the dynamic nature of a project. Accounts typically focus on recording routine costs and past expenditures associated with activities. Generally, past expenditures represent sunk costs that cannot be altered in the future and may or may not be relevant in the future. For example, after the completion of some activity, it may be discovered that some quality flaw renders the work useless. Unfortunately, the resources expended on the flawed construction will generally be sunk and cannot be recovered for re-construction (although it may be possible to change the burden of who pays for these resources by financial withholding or charges; owners will typically attempt to have constructors or designers pay for changes due to quality flaws). Since financial accounts are historical in nature, some means of forecasting or projecting the future course of a project is essential for management control. In this section, some methods for cost control and simple forecasts are described.

An example of forecasting used to assess the project status is shown in Table 5-1. In this example, costs are reported in five categories, representing the sum of all the various cost accounts associated with each category.

Table 5-1 Illustration of a Job Status Report

Factor	Budgeted Cost/$	Estimated Total Cost/$	Cost Committed/$	Cost Exposure/$	Cost To Date/$	Over or Under/$
Labor	99 406	102 342	49 596	—	52 746	2 936
Material	88 499	88 499	42 506	45 993	—	0
Subcontracts	198 458	196 323	83 352	97 832	15 139	(2 135)
Equipment	37 543	37 543	23 623	—	13 920	0
Other	72 693	81 432	49 356	—	32 076	8 739
Total	496 509	506 139	248 433	143 825	113 881	5 950

- Budgeted cost.

The budgeted cost is derived from the detailed cost estimate prepared at the start of the project. Examples of project budgets were presented in above section. The factors of cost would be referenced by cost account.

- Estimated total cost.

The estimated or forecast total cost in each category is the current best estimate of costs based on progress and any changes since the budget was formed. Estimated total costs are the sum of cost to date, commitments and exposure. Methods for estimating total costs are described below.

- Cost to date.

The actual cost incurred to date is recorded in column 6 and can be derived from the financial record keeping accounts.

- Over or Under.

A final column in Table 5-1 indicates the amount over or under the budget for each category. This column is an indicator of the extent of variance from the project budget; items with unusually large overruns would represent a particular managerial concern. Note that variance is used in the terminology of project control to indicate a difference between budgeted and actual expenditures. The term is defined and used quite differently in statistics or mathematical analysis. In Table 5-1, labor costs are running higher than expected, whereas subcontracts are less than expected.

The current status of the project is a forecast budget overrun of $ 5 950, with 23 percent of the budgeted project costs incurred to date.

For project control, managers would focus particular attention on items indicating substantial deviation from budgeted amounts. In particular, the cost overruns in the labor and in the other expense category would be worthy of attention by a project manager in Table 5-1. A next step would be to look in greater detail at the various components of these categories. Overruns in cost might be due to lower than expected productivity, higher than expected wage rates, higher than expected material costs, or other factors. Even further, low productivity might be caused by inadequate training, lack of required resources such as equipment or tools, or inordinate amounts of re-work to correct quality problems. Review of a job status report is only the first step in project control.

The job status report illustrated in Table 5-1 employs explicit estimates of ultimate cost in each category of expense. These estimates are used to identify the actual progress and status of an expense category. Estimates might be made from simple linear extrapolations of the productivity or cost of the work to date on each project item. Algebraically, a linear estimation formula is generally one of two forms. Using a linear extrapolation of costs, the forecast total cost, C_f, is:

$$C_f = \frac{C_t}{P_t} \qquad (5\text{-}1)$$

Where C_t is the cost incurred to time t and p_t is the proportion of the activity completed at time t. For example, an activity which is 50 percent complete with a cost of $40 000 would be estimated to have a total cost of $40 000/0.5 = $80 000. More elaborate methods of forecasting costs would disaggregate costs into different categories, with the total cost the sum of the forecast costs in each category.

Alternatively, the use of measured unit cost amounts can be used for forecasting total cost.

The basic formula for forecasting cost from unit costs is:

$$C_f = Wc_t \tag{5-2}$$

Where C_f is the forecast total cost, W is the total units of work, and c_t is the average cost per unit of work experienced up to time t. If the average unit cost is \$50 per unit of work on a particular activity and 1 600 units of work exist, then the expected cost is 1 600×50 = \$80 000 for completion. The unit cost in Equation (5-2) may be replaced with the hourly productivity and the unit cost per hour (or other appropriate time period), resulting in the equation:

$$C_f = Wh_t u_t \tag{5-3}$$

where the cost per work unit c_t is replaced by the time per unit, h_t, multiplied by the cost per unit of time, u_t .

More elaborate forecasting systems might recognize peculiar problems associated with work on particular items and modify these simple proportional cost estimates. For example, if productivity is improving as workers and managers become more familiar with the project activities, the estimate of total costs for an item might be revised downward. In this case, the estimating equation would become:

$$C_f = C_t + (W - W_t)c_t \tag{5-4}$$

where forecast total cost, C_f , is the sum of cost incurred to date, C_t, and the cost resulting from the remaining work ($W - W_t$) multiplied by the expected cost per unit time period for the remainder of the activity, c_t.

As a numerical example, suppose that the average unit cost has been \$50 per unit of work, but the most recent figure during a project is \$45 per unit of work. If the project manager was assured that the improved productivity could be maintained for the remainder of the project (consisting of 800 units of work out of a total of 1 600 units of work), the cost estimate would be 50×800+45×800= \$76 000 for completion of the activity. Note that this forecast uses the actual average productivity achieved on the first 800 units and uses a forecast of productivity for the remaining work.

In addition to changes in productivities, other components of the estimating formula can be adjusted or substituted. For example, the change in unit prices due to new labor contracts or material supplier's prices might be reflected in estimating future expenditures. In essence, the same problems encountered in preparing the detailed cost estimate are faced in the process of preparing exposure estimates, although the number and extent of uncertainties in the project environment decline as work progresses. The only exception to this rule is the danger of quality problems in completed work which would require re-construction.

Each of the estimating methods described above require current information on the state of work accomplishment for particular activities. There are several possible methods to develop such estimates, including:

- Units of work completed.

For easily measured quantities the actual proportion of completed work amounts can be measured. For example, the linear feet of piping installed can be compared to the required

amount of piping to estimate the percentage of piping work completed.

- Incremental milestones.

Particular activities can be sub-divided or "decomposed" into a series of milestones, and the milestones can be used to indicate the percentage of work complete based on historical averages. For example, the work effort involved with installation of standard piping might be divided into four milestones.

① Spool in place: 20% of work and 20% of cumulative work.

② Ends welded: 40% of work and 60% of cumulative work.

③ Hangars and Trim Complete: 30% of work and 90% of cumulative work.

④ Hydrotested and Complete: 10% of work and 100% of cumulative work.

Thus, a pipe section for which the ends have been welded would be reported as 60% complete.

- Opinion.

Subjective judgments of the percentage complete can be prepared by inspectors, supervisors or project managers themselves. Clearly, this estimated technique can be biased by optimism, pessimism or inaccurate observations. Knowledgeable estimaters and adequate field observations are required to obtain sufficient accuracy with this method.

- Cost ratio.

The cost incurred to date can also be used to estimate the work progress. For example, if an activity was budgeted to cost $20 000 and the cost incurred at a particular date was $10 000, then the estimated percentage complete under the cost ratio method would be 10 000/20 000 = 0.5 or fifty percent. This method provides no independent information on the actual percentage complete or any possible errors in the activity budget: the cost forecast will always be the budgeted amount. Consequently, managers must use the estimated costs to complete an activity derived from the cost ratio method with extreme caution.

Systematic application of these different estimating methods to the various project activities enables calculation of the percentage complete or the productivity estimates used in preparing job status reports.

In some cases, automated data acquisition for work accomplishments might be instituted. For example, transponders might be moved to the new work limits after each day's activity and the new locations automatically computed and compared with project plans. These measurements of actual progress should be stored in a central database and then processed for updating the project schedule.

Example 5.1 Estimated total cost to complete an activity.

Suppose that we wish to estimate the total cost to complete piping construction activities on a project. The piping construction involves 1 000 linear feet of piping which has been divided into 50 sections for management convenience. At this time, 400 linear feet of piping has been installed at a cost of $40 000 and 500 man-hours of labor. The original budget estimate was

$90 000 with a productivity of one foot per man-hour, a unit cost of $60 per man hour and a total material cost of $ 30 000. Firm commitments of material delivery for the $30 000 estimated cost have been received.

The first task is to estimate the proportion of work completed. First, 400 linear feet of pipe is in place out of a total of 1 000 linear feet, so the proportion of work completed is 400/1 000 = 0.4 or 40%. This is the "units of work completed" estimation method. Second, the cost ratio method would estimate the work complete as the cost-to-date divided by the cost estimate or $40 000/ $ 90 000 = 0.44 or 44%.Third, the "incremental milestones" method would be applied by examining each pipe section and estimating a percentage complete and then aggregating to determine the total percentage complete. For example, suppose the following quantities of piping fell into four categories of completeness:

complete (100%)	380 ft
hangars and trim complete (90%)	20 ft
ends welded (60%)	5 ft
spool in place (20%)	0 ft

Then using the incremental milestones shown above, the estimate of completed work would be 380 + 20×0.9 + 5×0.6 + 0 = 401 ft and the proportion complete would be 401 ft/1 000 ft = 0.401 or 40% after rounding.

Once an estimate of work completed is available, then the estimated cost to complete the activity can be calculated. First, a simple linear extrapolation of cost results in an estimate of $40 000/0.4 = $100 000 for or the piping construction using the 40% estimate of work completed. This estimate projects a cost overrun of 100 000−90 000 = $10 000.

Second, a linear extrapolation of productivity results in an estimate of (1 000 ft)(500 hrs/400 ft)($60/hr) + 30 000 = $105 000 for completion of the piping construction. This estimate suggests a variance of 105 000−90 000 = $15 000 above the activity estimate. The source of the variance can also be identified in this calculation: compared to the original estimate, the labor productivity is 1.25 hours per foot or 25% higher than the original estimate.

Example 5.2　Estimated Total Cost for Completion.

The forecasting procedures described above assumed linear extrapolations of future costs, based either on the complete experience on the activity or the recent experience. For activities with good historical records, it can be the case that a typically non-linear profile of cost expenditures and completion proportions can be estimated. Figure 5.1 illustrates one possible non-linear relationships derived from experience in some particular activity. For example, point A in Figure 5.1 suggests a higher expenditure than is normal for the completion proportion. This point represents 40% of work completed with an expenditure of 60% of the budget. Since the historical record suggests only 50% of the budget should be expended at time of 40% completion, a 60%−50%=10% overrun in cost is expected. If comparable cost overruns continue to accumulate, then the cost-to-complete will be even higher.

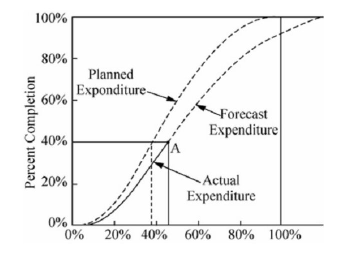


Figure 5.1 Illustration of Proportion Completion versus Expenditure for an Activity

Questions

1. What's the disadvantage of traditional financial accounting schemes?
2. What does the term "sunk costs" mean?
3. How to calculate the estimated total cost?
4. For project control, managers would focus particular attention on items indicating substantial deviation from budgeted accounts, why?
5. Which factors may cause overruns in cost?
6. How many methods can be used to get the forecast total cost? What are they?
7. What does the term "units of work completed" mean?
8. How to understand the term "incremental milestone"?
9. How to calculate cost ratio?
10. In some cases, automated data acquisition for work accomplishments might be instituted, why?

Vocabulary, Phrases and Expressions

financial accounting：财务计算；财务会计
sunk cost：沉没成本；已支付成本
forecasting for activity cost：工作成本预测
cost to date：完工成本
cost committed：承诺成本
cost exposure：附加成本
project control：项目控制
job status report：工作状况报告
units of work completed：完工劳动单元
incremental milestones：里程碑累计

field observations：现场观察

cost ratio：成本率

estimated total cost for completion：预计完工总成本

参 考 译 文

第 5 单元　项目预算(2)——工作成本预测

对于项目的管理和控制而言，仅考虑项目中已经发生了的成本和收益是不够的。好的项目经理还会关注未来成本、收益和一些技术问题。传统的财务会计计划无法反映出项目的动态特征，而只能集中在对日常性成本和已发生的各项工作开支的记录上。通常把过去已经发生且在未来无法再改变的支出称为“沉没成本”。例如，当某些工作完成后，有时会发现由于存在质量缺陷而使得产品毫无用处。遗憾的是，耗费在缺陷的建筑产品上的各种资源通常就“沉没了”，并且无法通过重建而得到恢复(尽管可以根据责任的归属来确定由谁承担所造成的损失，业主也会要求承包商或设计方来负担由于质量缺陷而产生的费用)。由于财务报告的历史局限性，为了进行有效的管理和控制，有必要使用一些预测和规划项目未来进程的方法和手段。下面将介绍一些有关成本控制和预测的方法。

一个用来预测和评价项目状况的例子见表 5-1。在这个例子当中，成本按 5 个项次进行统计，每个项次再按不同口径进行汇总。

表 5-1　工作状况报告示例

要素	预算成本/$	预计总成本/$	承诺成本/$	附加成本	完工成本/$	超支或节约/$
人工	99 406	102 342	49 596	—	52 746	2 936
材料	88 499	88 499	42 506	45 993	—	0
合同分包	198 458	196 323	83 352	97 832	15 139	(2 135)
设备	37 543	37 543	23 623	—	13 920	0
其他	72 693	81 432	49 356	—	32 076	8 739
总计	496 509	506 139	248 433	143 825	113 881	5 950

● 预算成本。

预算成本由项目初始阶段的详细成本估算得来。项目预算的例子在上一部分已经介绍过。成本要素可参考成本报告。

● 预计总成本。

每一项次的预计总成本是根据预算形成后项目的实际进展和变化对当前成本的最为精确的估算。预计总成本由完工成本、承诺成本和附加成本累加得到。估算总成本的方法将在下面介绍。

● 完工成本。

已完工的实际成本记录在表 5-1 的第 6 栏里，它可由财务记录报告得到。

● 超支或节约。

表 5-1 的最后一栏显示了每一项次预算超支或节约的数值，这一栏也是预算偏差的指示器。那些超出合理范围的成本偏差应当引起管理上的关注。注意，被用在项目控制中的“偏差”一词指的是预算值和实际值之间的差异。在统计学和数学分析中，这个术语的定义和使用是完全不同的。在表 5-1 中，人工成本比预期的高，而分包合同成本却比预期的低。

项目目前的状况是预计总成本相对于预算成本超支 5 950 美元，同时完工成本占预算成本的比例为 23%。

从项目控制的角度而言，项目经理应对那些和预算成本有重大偏差的项次给予特殊的关注。具体地说，在表 5-1 中，“人工”和其他两个项次都出现了超支的现象，应当引起注意。而下一步则要具体分析这些项次的不同组成部分的具体情况。例如，成本的超支可能是由于劳动生产率的降低、工资的提高、材料涨价或其他原因等引起的。进一步讲，劳动生产率的降低又有可能源于新来的工人未经培训、缺乏机器和设备等生产所需的资源、纠正质量问题的重复工作不当等原因。分析工作状况报告只是项目控制的第一步。

表 5-1 所示的工作状况报告对每一个费用项次都给出了较为精确的最终成本估算。这个估算被用来判别项目的实际进展和某成本项次的状况。这个估算值可以用每一项次的劳动生产率或完工成本进行简单的线性推演得到。在代数学中，一个线性估算的方程通常有两种形式。用成本的线性推演可得预测总成本 C_f，即

$$C_f = \frac{C_t}{P_t} \tag{5-1}$$

其中，C_t 为某工作在 t 时刻所发生的成本，P_t 为 t 时刻某工作完工的百分比。例如，某花费 40 000 美元且已完工 50%的工作其预测总成本为 40 000 美元/0.5=80 000 美元。更为精确的方法是将成本分解成不同的项次，再将每一项次的预测成本汇总得到总预测成本。

此外，还可以用单位成本数来得到预测总成本。其公式为

$$C_f = Wc_t \tag{5-2}$$

其中，C_f 为预测总成本，W 为总劳动单元数，而 c_t 为已完工劳动单元的平均成本。如果某项具体工作包含 1 600 个劳动单元，而每个劳动单元的平均成本为 50 美元，则完工时的预测总成本为 1 600×50 美元=80 000 美元，方程(5-2)中的单位成本可用每小时劳动生产率和每小时(或其他合适的时间段)单位成本的乘积代替，即

$$C_f = Wh_t u_t \tag{5-3}$$

其中，h_t 为每一劳动单元所耗时间，u_t 为每一单位时间所耗成本。

一些更为精确的方法可以反映出某项具体工作中与劳动有关的特殊问题，并适当调整成本预测的比例。例如，如果由于工人和项目经理更加熟悉项目工作而使得劳动生产率得以提高，那么项目工作的预测总成本应向下调整。在这种情况下，预测方程就变为

$$C_f = C_t + (W - W_t)c_t \tag{5-4}$$

其中，预测总成本 C_f 等于完工成本 C_t 加上剩余工作(W−W_t)和剩余工作的预测期单位成本 c_t 的乘积。

在前面的例子当中，曾经假定每劳动单元的平均成本为 50 美元，但项目近期劳动单元成本为 45 美元。如果项目经理确信项目的剩余工作能够将改进了的生产率保持下去(在 1 600 个劳动单元中，有 800 个剩余劳动单元)，那么项目完成的预测成本应为 50×800 美

元+45×800 美元=76 000 美元。注意，这里面分别用到了已完工 800 个劳动单元的实际平均生产率和剩余劳动单元的预计生产率。

除了生产率的变化之外，预测方程中的其他组成部分也可以进行替换或调整。例如，由于新的劳动合同或材料价格所引起的单元上的变化也可以在预测总成本中得以反映。实际上，在计算附加成本时也会遇到同样的问题，尽管随着项目的不断进展，项目当中不确定性的量和度都呈下降趋势。这个规则的唯一例外是完工产品因为严重质量问题而需返修重建的情形。

上面所介绍的每一种预测方法都需要具体工作的劳动量完成状态信息。下面的几种方法有助于进行成本的预测。

- 完工劳动单元。

对于易于测量的劳动数量，可直接得到实际完工劳动量占总劳动量的比例。例如，将已安装的直线管道和需要安装的管道数量进行比较便可测算出已完工管道劳动量的百分比。

- 里程碑累计。

某项具体工作可被分解成一系列的里程碑，而这些里程碑可用来显示完工劳动量基于历史平均值的百分比。例如，某标准管道安装工作的劳动可被划分为如下 4 个里程碑。

① 管轴就位：20%的劳动量和 20%的累计劳动量。

② 管道焊接：40%的劳动量和 60%的累计劳动量。

③ 支座和清理：30%的劳动量和 90%的累计劳动量。

④ 热压测试和完工：10%的劳动量和 100%的累计劳动量。

从这里可以看出，管缝焊接完工时，工作总劳动量的 60%已经完成。

- 判断。

对于完工百分比的主观判断可由监督方、监理方或项目经理自己做出。显然，由于乐观、悲观或观察不够细致等主观原因，会使上面所做出的判断有所偏颇。因此，使用这种方法要想保证相当的准确性，就要求预测者不但具有丰富的知识，还应有足够的现场观察。

- 成本率。

完工成本也能用来预测工作进度。例如，如果某工作的预算成本为 20 000 美元而截止某特定日期已发生的成本为 10 000 美元，那么用成本率来表示预测完工百分率就是 10 000/20 000=0.5 或 50%。然而，用这种方法来准确地反映工作实际完工比例还需依靠其他信息，并且会产生工作预算上的一些错误，因为在这里，预测成本始终等于预算成本。因此，项目经理在用成本率导出的预测成本来完成某工作时必须极其审慎。

通过对各种项目工作系统地运用不同的预测方法，可以计算出工作状况报告要用到的完工百分比和生产率的估算值。

在有些情况下，需要构建一个自动读取完工数据的系统。例如，在当天工作完成之后，读取器会自动移向新的工作表及其地址进行运算并和项目计划进行比较。项目的实际进度会被存储到中央数据库中，经过处理后用以更新项目计划。

例 5.1　完成某项工作的预计总成本。

假定欲估算某项目直线管道铺设工程的总成本。该管道工程是总长为 1 000 英尺(1 英尺=0.304 8 米)的直线管道铺设，为了方便管理被划分成 50 段。此时，已有 400 英尺的直线管道以 40 000 美元的成本和 500 人工时的劳动力进行了铺设。初始预算约为 90 000 美元，其中生产率为 1 英尺/工时，每工时的单位成本为 60 美元，且总的材料成本为 30 000 美元。

材料的运输已得到保证。

第一项工作是估算完工劳动的比例。首先，已对总长度为 1 000 英尺的直线管道中的 400 英尺进行了铺设，所以已完工劳动的百分比为 400/1 000=0.4 或 40%。这里用到的是完工劳动单元估算法。其次，用成本率法来估算完工劳动率，即用完工成本除以估算成本，亦即 40 000 美元/90 000 美元=0.44 或 44%。最后，用“里程碑累计”法来核对管道的每一分项工程，估算其完工百分比并进行逐项累计，以确定总完工百分比。例如，假定把管道工程的完成按 4 个类别进行划分。

全部完成(100%)：380 英尺。

完成了支座和清理(90%)：20 英尺。

完成了管缝焊接(60%)：5 英尺。

完成了管轴就位(20%)：0 英尺。

根据上面的里程碑累计，完工劳动的估算应当为(380+20×0.9+5×0.6+0)英尺=401 英尺，完工比例为 401 英尺/1 000 英尺=0.401，或近似取 0.4。

一旦得到了完工劳动量的估算值，就可以进行工作完工成本的计算。首先，由于管道工程已完成了约 40%，所以用线性推演得到的预计成本为 40 000 美元/0.4=100 000 美元。这意味着按当前状态项目将会出现(100 000−90 000)美元=10 000 美元的成本超支。

其次，如果用生产率进行线性推演，可得管道工程的完工估算成本为 1 000 英尺×500 小时/400 英尺×60 美元/小时+30 000 美元=105 000 美元。在这种情况下，预计有(105 000−90 000)美元=15 000 美元的成本偏差。偏差的原因也可以理解为和初始估算相比，劳动生产率为 1.25 小时/英尺或比初始估算中的劳动生产率在每英尺管道上多用了 0.25 小时。

例 5.2　完工项目的预计总成本。

上例中的预测程序是在对工作有完全的或近期的经验基础上，用线性方法来推断未来的成本。而对有些历史数据完整的工作，即使数据之间成非线性关系，仍可预测其成本超支和完工百分比。图 5.1 所示为成本和完工百分比呈非线性关系的某工作。例如，图 5.1 中的 A 点表示在对应的完工百分比上其成本却有所超支，即在该点劳动量完成了 40%，但成本支出却占到了预算成本的 60%。而根据历史统计，当劳动量完成 40%时，成本支出应占预算成本的 50%，因此出现了 60%−50%=10%的成本偏差。如果这种可比的成本超支继续累计下去，那么完工成本将变高。

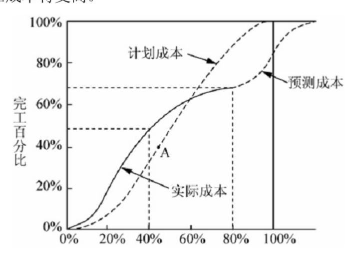


图 5.1　工作成本和完工百分比

Unit 6 The Contractor

The Contractor's General Obligations

The Contractor shall design, execute and complete the Works in accordance with the Contract, and shall remedy any defects in the Works. When completed, the Works shall be fit for the purposes for which the Works are intended as defined in the Contract.

The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

The Works shall include any work which is necessary to satisfy the Employer's Requirements, or is implied by the Contract, and all works which (although not mentioned in the Contract) are necessary for stability or for the completion, or safe and proper operation, of the Works.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations, of all methods of construction and of all the Works.

The Contractor shall, whenever required by the Employer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Employer.

Performance security

The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount and currencies stated in the Particular Conditions if an amount is not stated in the Particular Conditions, this Sub-Clause shall not apply.

The Contractor shall deliver the Performance Security to the Employer within 28 days after both Parties have signed the Contract Agreement. The Performance Security shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to

which the Employer is entitled under the Contract in the event of:

(1) failure by the Contractor to extend the validity of the Performance Security as described in the preceding paragraph, in which event the Employer may claim the full amount of the Performance Security.

(2) failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 2.5 [Employer's Claims] or Clause 20 [Claims, Disputes and Arbitration], within 42 days after this agreement or determination.

(3) failure by the Contractor to remedy a default within 42 days after receiving the Employer's notice requiring the default to be remedied.

(4) circumstances which entitle the Employer to termination under Sub-Clause 15.2 [Termination by Employer], irrespective of whether notice of termination has been given.

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

The Employer shall return the Performance Security to the Contractor within 21 days after the Contractor has become entitled to receive the Performance Certificate.

Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Employer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Employer, revoke the appointment of the Contractor's Representative or appoint a replacement.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.4 [Instructions].

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Employer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

The Contractor's Representative and all these persons shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language].

Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Where specified in the Particular Conditions, the Contractor shall give the Employer not less than 28 days' notice of:

(1) the intended appointment of the Subcontractor, with detailed particulars which shall include his relevant experience.

(2) the intended commencement of the Subcontractor's work.

(3) the intended commencement of the Subcontractor's work on the Site.

Nominated Subcontractors

In this Sub-Clause, "nominated Subcontractor" means a Subcontractor whom the Employer, under Clause 13 [Variations and Adjustments], instructs the Contractor to employ as a Subcontractor. The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Employer as soon as practicable, with supporting particulars.

Co-operation

The Contractor shall, as specified in the Contract or as instructed by the Employer, allow appropriate opportunities for carrying out work to:

- the Employer's personnel
- any other contractors employed by the Employer
- the personnel of any legally constituted public authorities

who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a variation if and to the extent that it causes the Contractor to incur Cost in an amount which was not reasonably foreseeable by an experienced contractor by the date for submission of the Tender. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

The Contractor shall be responsible for his construction activities on the Site, and shall co-ordinate his own activities with those of other contractors to the extent (if any) specified in the Employer's Requirements.

If, under the Contract, the Employer is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractors Documents, the Contractor shall submit such documents to the Employer in the time and manner stated in the Employer's Requirements.

Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract. The Contractor shall be responsible for the correct positioning of all parts of the works, and shall rectify any error in the positions, levels, dimensions or

alignment of the Works.

Safety Procedures

The Contractor shall:

(1) comply with all applicable safety regulations.

(2) take care for the safety of all persons entitled to be on the Site.

(3) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons.

(4) providing fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over].

(5) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

Quality Assurance

The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Employer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Employer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Employer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

Site Data

The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on subsurface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data which come into the Employer's possession after the Base Date.

The contractor shall be responsible for verifying and interpreting all such data. The Employer shall have no responsibility for the accuracy or completeness of such data, except as stated in Sub-Clause 5.1 [General Design Responsibilities].

Sufficiency of the Contract Price

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Contract Price.

Unless otherwise stated in the Contract, the Contract price covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things

necessary for the proper design, execution and completion of the Works and the remedying of any defects.

Unforeseeable Difficulties

Except as otherwise stated in the Contract:

(1) the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works.

(2) by signing the Contract, the Contractor accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works.

(3) the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs.

Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights-of-way which he may require, including those for access to the Site. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the Site which he may require for purposes of the Works.

Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

(1) the convenience of the public.

(2) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

Access Route

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

(1) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes.

(2) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions.

(3) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route.

(4) the Employer does not guarantee the suitability or availability of particular access routes.

(5) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

Transport of Goods

Unless otherwise stated in the Particular Conditions.

(1) the Contractor shall give the Employer not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site.

(2) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works.

(3) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

Contractor's Equipment

The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works.

Protection of the Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Employer's Requirements, and shall not exceed the values prescribed by applicable Laws.

Electricity, Water and Gas

The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require.

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Employer's Requirements. The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

Employer's Equipment and Free-Issue Material

The Employer shall make the Employer's Equipment (if any) available for the use of the Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Employer's Requirements. Unless otherwise stated in the Employer's Requirements:

(1) the Employer shall be responsible for the Employer's Equipment, except that stated in (2).

(2) the Contractor shall be responsible for each item of Employer's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

The appropriate quantities and the amounts due (at such stated price) for the use of Employer's Equipment shall be agreed or determined in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

The Employer shall supply, free of charge, the "free-issue material" (if any) in accordance with the details stated in the Employer's Requirement. The Employer shall, at his risk and cost, provide these materials at the time and place specified in the contractor. The Contractor shall then visually inspect them, and shall promptly give notice to the Employer of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Employer shall immediately rectify the notified shortage, defect or default.

After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Employer of liability for any shortage, defect or default not apparent from a visual inspection.

Progress Reports

Unless otherwise stated in the Particular Conditions, monthly progress reports shall be prepared by the Contractor and submitted to the Employer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

Each report shall include:

(1) charts and detailed descriptions of progress, including each stage of design, Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection, testing, commissioning and trial operation.

(2) photographs showing the status of manufacture and of progress on the Site.

(3) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dated of:

- commencement of manufacture.
- Contractor's inspections.
- test.
- shipment and arrival at the Site.

(4) the details described in Sub-Clause 6.10 [Records of Contractor's personnel and Equipment].

(5) copies of quality assurance document documents, test results and certificates of Materials.

(6) list of Variations, notices given under Sub-Clause 2.5 [Employer's Claims] and notices given under Sub-Clause 20.1 [Contractor's Claims].

(7) safety statistic, including details of any hazardous incidents and activities relating to environmental aspect and public relations.

(8) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

Security of the Site

Unless otherwise stated in the Particular Conditions:

(1) the Contractor shall be responsible for keeping unauthorized persons off the Site.

(2) authorized persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor, by (or on behalf of) the Employer, as authorized personnel of the Employer's other contractors on the Site.

Contractor's Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Employer as working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

Upon the issue of the Taking-Over Certificate for the Works, the Contractor shall clear away and remove all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such goods as are required for the Contractor to fulfill obligations under the Contract.

Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Employer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs cost from complying with the instructions, the Contractor shall give a further notice to the

Employer and shall be entitled subject to Sub-Clause 20.1[Contractor's Claims] to:

(1) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion].

(2) payment of any such cost, which shall be added to the Contract Price.

After receiving this further notice, the Employer shall proceed in accordance with Sub-Clause 3.5[Determinations] to agree or determine these matters.

Questions

1. What shall contractor do according to the contractor's general obligations?
2. By whom shall the performance security be issued?
3. In what event may the employer claim the full amount of the performance security?
4. When shall the employer return the performance security to the contractor?
5. Who shall appoint the contractor's representative, the contractor or the employer?
6. Shall the contractor be responsible for the acts or defaults of any subcontractor, his agents or employees, as if they were the acts or defaults of the contractor?
7. Of what notice shall the contractor give the employer not less than 28 day's ?
8. Who shall set out the works in relation to original points, lines and levels of reference specified in the contract?
9. Who shall be responsible for the correct positioning of all parts of the works?
10. Shall the employer be entitled to audit any aspect of the quality assurance system?

Vocabulary, Phrases and Expressions

performance security：履约担保
expiry date：有效期限；满期日；终止日期
contractor's representative：承包商代表
subcontractor：分包商
agents：代理(商)
nominated subcontractor：指定的分包商
variation：变更；变化
set out：放线
safety procedures：安全程序
quality assurance system：质量保证体系
base date：基准日期
site data：现场数据
contract price：合同价格
rights-of-way：道路通行权
additional facilities outside the site：现场以外的附加设施

access routes：进场通路
permission：许可
transport of goods：货物运输
negotiate：谈判；协商
protection of the environment：环境保护
contractor's equipment：承包商设备
employer's equipment：雇主设备
free-issue material：免费供应材料
progress reports：进度报告
security of the site：现场保安
contractor's operations on site：承包商的现场作业
temporary works：临时工程
taking-over certificate：接收证书

参 考 译 文

第6单元　承　包　商

承包商的一般义务

承包商应按照合同设计、实施和完成工程，并修补工程中的任何缺陷。完成后，工程应能满足合同规定的工程预期目的。

承包商应提供合同规定的生产设备和承包商文件，以及设计、施工、竣工和修补缺陷所需的所有临时性或永久性的承包商人员、货物、消耗品及其他物品和服务。

工程应包括为满足雇主要求或合同隐含要求的任何工作，以及(合同虽未提及但)为工程的稳定或完整、安全和有效运行所需的所有工作。

承包商应对所有现场作业、所有施工方法和全部工程的完备性、稳定性和安全性承担责任。

当雇主提出要求时，承包商应提交其建议采用的工程施工安排和方法的细节。若事先未通知雇主，对这些安排和方法不得做重要改变。

履约担保

承包商应对严格履约(自费)取得履约担保，保证金额与币种应符合专用条件中的规定。专用条件中没有提出保证金额的，本款应不适用。

承包商应在双方签署合同协议书后28天内，将履约担保交给雇主。履约担保应由雇主批准的国家(或其他司法管辖区)内的实体提供，并采用专用条件所附格式或采用雇主批准的其他格式。

承包商应确保履约担保直到其完成工程的施工、竣工和修补完任何缺陷前持续有效和可执行。如果在履约担保的条款中规定了其期满日期，而承包商在该期满日期28天前尚无

权拿到履约证书，承包商应将履约担保的有效期延至工程竣工和修补完任何缺陷时为止。

除出现以下情况雇主根据合同有权获得赔偿金额外，雇主不应根据履约担保提出索赔：

(1) 承包商未能按前一段所述延长履约担保的有效期，这时雇主可以索赔履约担保的全部金额。

(2) 承包商未能在商定或决定后 42 天内，将承包商同意的，或根据第 2.5 款［雇主的索赔］或第 20 条［索赔、争端和仲裁］的规定确定的承包商应付金额付给雇主。

(3) 承包商未能在收到雇主要求纠正违约的通知后 42 天内进行纠正。

(4) 根据第 15.2 款［由雇主终止］的规定，雇主有权终止的情况，不管是否已发出终止通知。

雇主应保障并保持承包商免受因雇主根据履约担保提出的超出雇主有权索赔范围的索赔引起的所有损害赔偿费、损失和开支(包括法律费用和开支)的伤害。

雇主应在承包商有权获得履约证书后 21 天内，将履约担保退还承包商。

承包商代表

承包商应任命承包商代表，并授予他代表承包商根据合同采取行动所需要的全部权力。除非合同中已写明承包商代表的姓名，承包商应在开工日期前，将其拟任命为承包商代表的人员姓名和详细资料提交给雇主，以取得同意。如果未获同意，或随后撤销了同意，或任命的人不能担任承包商代表，承包商应同样地提交另外适合人选的姓名、详细资料，以取得该项任命。

未经雇主事先同意，承包商不应撤销承包商代表的任命，或任命替代人员。

承包商代表应代表承包商受理根据第 3.4 款［指示］规定的指示。

承包商代表可向任何胜任的人员托付任何职权、任务和权力，并可随时撤销托付。任何托付或撤销，应在雇主收到承包商代表签发的指明人员姓名并说明托付或撤销的职权、任务和权力的事先通知后生效。

承包商代表和所有这些人员应能流利地使用第 1.4 款［法律和语言］规定的交流语言。

分包商

承包商不得将整个工程分包出去。

承包商应对任何分包商、其代理人或雇员的行为或违约，如同承包商自己的行为或违约一样地负责。对专用条件中有规定的，承包商应在不少于 28 天前向雇主通知以下事项。

(1) 拟雇用的分包商，并附包括其相关经验的详细资料。

(2) 分包商承担工作的拟定开工日期。

(3) 分包商承担现场工作的拟定开工日期。

指定的分包商

在本款中，“指定的分包商”系指雇主根据第 13 条［变更和调整］的规定，指示承包商雇用的分包商。如果承包商对指定的分包商尽快向雇主发出通知，提出合理的反对意见，并附有详细的依据资料，承包商不应有任何雇用义务。

合作

承包商应依据合同的规定或雇主的指示，为可能被雇用在现场或其附近从事本合同未

包括的任何工作的下列人员进行工作提供适当的机会：

- 雇主人员
- 雇主雇用的任何其他承包商
- 任何合法建立的公共当局的人员

如果任何此类指示导致承包商增加费用，达到一个有经验的承包商在提交投标书时不能合理预见的数额时，该指示应构成一项变更。为这些人员和其他承包商的服务可包括使用承包商设备以及由承包商负责的临时工程或进入的安排。

承包商应对其在现场的施工活动负责，并应按照雇主要求中规定的范围(如果有)协调其自己与其他承包商的活动。

如果根据合同，要求雇主按照承包商文件向承包商提供任何基础、结构、生产设备或进入手段的占用权，承包商应按雇主要求中提出的时间和方式，向雇主提交此类文件。

放线

承包商应根据合同中规定的原始基准点、基准线和基准标高，给工程放线。承包商应负责对工程的所有部分正确定位，并纠正在工程的位置、标高、尺寸或定线中出现的任何差错。

安全程序

承包商应：

(1) 遵守所有适用的安全规则。

(2) 照料有权在现场的所有人员的安全。

(3) 尽合理的努力保持现场和工程没有不需要的障碍物，以避免对这些人员造成危险。

(4) 在工程竣工和按照第 10 条[雇主的接收]的规定移交前，提供围栏、照明、保卫和看守。

(5) 因实施工程为公众和临近土地的所有人、占用人使用和提供保护，提供可能需要的任何临时工程(包括道路、人行路、防护物和围栏等)。

质量保证

承包商应建立质量保证体系，以证实符合合同要求。该体系应符合合同的详细规定。雇主有权对体系的任何方面进行审查。

承包商应在每一设计和实施阶段开始前，向雇主提交所有程序和如何贯彻要求的文件的细节，供其参考。向雇主发送任何技术性文件时，文件本身应有经承包商本人事先批准的明显证据。

遵守质量保证体系，不应解除合同规定的承包商的任何任务、义务和职责。

现场数据

雇主应在基准日期前，将其取得的现场地下和水文条件及环境方面的所有有关资料提交给承包商。同样地，雇主在基准日期后得到的所有此类资料也应提交给承包商。

承包商应负责核实和解释所有此类资料。除第 5.1 款[设计义务一般要求]提出的情况以外，雇主对这些资料的准确性、充分性和完整性不承担责任。

合同价格

承包商应被认为已确信合同价格的正确性和充分性。

除非合同另有规定，合同价格包括承包商根据合同所承担的全部义务(包括根据暂列金额所承担的义务，如果有)，以及为正确设计、实施和完成工程并修补任何缺陷所需的全部有关事项。

不可预见的困难

除合同另有说明外：

(1) 承包商应被认为已取得了对工程可能产生影响和作用的有关风险、意外事件和其他情况的全部必要资料。

(2) 通过签署合同，承包商接受对预见到的所有困难和成功完成工程所需的费用所负的全部责任。

(3) 对于任何未预见到的困难和费用不应考虑调整合同价格。

道路通行权与设施

承包商应为其所需要的专用和(或)临时道路包括进场道路的通行权承担全部费用和开支。承包商还应自担风险和费用，取得为工程目的可能需要的现场以外的任何附加设施。

避免干扰

承包商应避免对以下事项产生不必要或不当的干扰。

(1) 公众的方便。

(2) 所有道路和人行道的进入、使用和占用，不论他们是公共的，还是雇主或是其他人所有的。

承包商应保障并保持雇主免受因任何此类不必要或不当的干扰造成任何损害赔偿费、损失和开支(包括法律费用和开支)的伤害。

进场通路

承包商应被认为已对现场的进入道路的适宜性和可用性感到满意。承包商应尽合理的努力，防止任何道路或桥梁因承包商的通行或承包商人员受到损坏。这些努力应包括正确使用适宜的车辆和道路。

除本条件另有规定外：

(1) 承包商应(就双方而言)对因他使用现场通路而需要的任何维护负责。

(2) 承包商应提供进场道路的所有必需的标志或方向指示，还应为他使用这些道路、标志和方向指示取得必要的有关当局的许可。

(3) 雇主不应对由于任何进场通路的使用或其他原因引起的索赔负责。

(4) 雇主不保证特定进场通路的适宜性和可用性。

(5) 因进场通路对承包商的使用要求不适宜、不能用而发生的费用应由承包商负担。

货物运输

除非专用条件中另有规定：

(1) 承包商应在不少于 21 天前，将任何工程设备或每项其他主要货物将运到现场的日

期通知给雇主。

(2) 承包商应负责工程需要的所有货物和其他物品的包装、装货、运输、接收、卸货、存储和保护。

(3) 承包商应保障并保持雇主免受因货物运输引起的所有损害赔偿费、损失和开支(包括法律费用和开支)的伤害，并应协商和支付由于货物运输引起的所有索赔。

承包商设备

承包商应负责所有承包商设备。承包商设备运到现场后，应视作准备为工程施工专用。

环境保护

承包商应采取一切适当措施，保护(现场内外)环境，限制由其施工作业引起的污染、噪音和其他后果对公众和财产造成的损害和妨害。

承包商应确保因其活动产生的气体排放、地面排水及排污等不超过雇主要求中规定的数值，也不超过适用法律规定的数值。

电、水和燃气

除下述情况外，承包商应负责供应其所需的所有电、水和其他服务。

承包商应有权因工程的需要使用现场可供的电力、水、燃气和其他服务，其详细规定和价格见雇主要求。承包商应自担风险和费用，提供他使用这些服务和计量所需要的任何仪器。

这些服务的耗用数量和应付金额(按其价格)应根据第 2.5 款[雇主的索赔]和第 3.5 款[确定]的要求商定或确定。承包商应向雇主支付此金额。

雇主设备和免费供应的材料

雇主应准备雇主设备(如果有)，供承包商按照雇主要求中提出的细节、安排和价格，在工程实施中使用。除非在雇主要求中另有说明：

(1) 除(2)所列情况外，雇主应对雇主设备负责。

(2) 当任何承包商人员操作、驾驶、指挥或占用或控制某项雇主设备时，承包商应对该项设备负责。

使用雇主设备的适当数量和应付费用金额(按规定价格)应按第 2.5 款[雇主的索赔]和第 3.5 款[确定]的要求商定或确定。承包商应按此金额付给雇主。

雇主应按照雇主要求中规定的细节免费提供“免费供应的材料”(如果有)。雇主应自行承担风险和费用，按照合同规定的时间和地点供应这些材料。随后，承包商应对其进行目视检查，并将这些材料的短少、缺陷或缺项迅速通知给雇主。除非双方另有协议，雇主应立即改正通知指出的短少、缺陷或缺项。

目视检查后，这些免费供应的材料应由承包商照管、监护和控制。承包商的检查、照管、监护和控制的义务，不应解除雇主对目视检查难发现的任何短少、缺陷或缺项所负的责任。

进度报告

除非专用条件中另有规定，承包商应编制月进度报告，一式六份，提交给雇主。第一

次报告所包括的期间，应自开工日期起至当月的月底止。以后应每月报告一次，在每次报告期最后一天后 7 日内报出。

报告应持续到承包商完成在工程移交证书上注明的竣工日期时所有未完扫尾工作为止。

每份报告应包括：

(1) 设计、承包商文件、采购、制造、货物运达现场、施工、安装、试验、投产准备和试运行等每一阶段进展情况的图表和详细说明。

(2) 反映制造情况和现场进展情况的照片。

(3) 关于每项主要工程设备和材料的生产，制造商名称、制造地点、进度百分比，以及下列事项的实际或预计日期。

- 开始制造。
- 承包商检验。
- 试验。
- 发货和运抵现场。

(4) 第 6.10 款[承包商的人员和设备的记录]中所述的细节。

(5) 材料的质量保证文件、试验结果及合格证的副本。

(6) 变更、根据第 2.5 款[雇主的索赔]的规定发出的通知和根据第 20.1 款[承包商的索赔]的规定发出的通知的清单。

(7) 安全统计，包括对环境和公共关系有危害的任何事件与活动的详细情况。

(8) 实际进度与计划进度的对比，包括可能影响按合同竣工的任何事件或情况的详情，以及为消除延误正在(或准备)采取的措施。

现场保安

除非专用条件中另有规定，否则：

(1) 承包商应负责阻止未经授权的人员进入现场。

(2) 授权人员应仅限于承包商人员和雇主人员，以及由(或代表)雇主通知承包商，作为雇主在现场的其他承包商的授权人员的任何其他人员。

承包商的现场作业

承包商应将其作业限制在现场，以及承包商可得到并经雇主同意作为工作场地的任何附加区域内。承包商应采取一切必要的预防措施，以保持承包商设备和承包商人员处在现场和此类附加区域内，避免他们进入邻近地区。

在工程施工期间，承包商应保持现场没有一切不必要的障碍物，并应妥善存放和处置承包商设备或多余的材料。承包商应从现场清除并运走任何残物、垃圾和不再需要的临时工程。

在颁发工程接收证书后，承包商应清除并运走所有承包商设备、剩余材料、残物、垃圾和临时工程。承包商应使现场和工程处于清洁和安全的状况。但在缺陷通知期限内，承包商可在现场保留其根据合同完成规定义务所需要的此类货物。

化石

在现场发现的所有化石、硬币、有价值的物品或文物，以及具有地质或考古意义的结

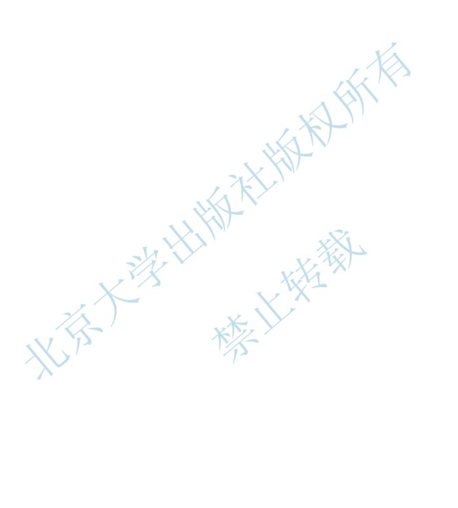
构物和其他遗迹或物品，应置于雇主的照管和权限下。承包商应采取合理的预防措施，防止承包商人员或其他人员移动或损坏任何这类发现物。

一旦发现任何上述物品，承包商应立即通知雇主。雇主应就处理上述物品发出指示。如果承包商因执行这些指示遭受延误和(或)招致费用，承包商应向雇主再次发出通知，有权根据第 20.1 款[承包商的索赔]的规定提出：

(1) 根据第 8.4 款[竣工时间的延长]的规定，如果竣工已或将受到延误，对任何此类延误给予延长期。

(2) 任何上述费用应加入合同价格，给予支付。

雇主收到进一步的通知后，应按照第 3.5 款[确定]的要求商定或确定这些事项。



Unit 7　Types of Construction Contracts

While construction contracts serve as a means of pricing construction, they also structure the allocation of risk to the various parties involved. The owner has the sole power to decide what type of contract should be used for a specific facility to be constructed and to set forth the terms in a contractual agreement. It is important to understand the risks of the contractors associated with different types of construction contracts.

- Lump Sum Contract.

In a lump sum contract, the owner has essentially assigned all the risk to the contractor, who in turn can be expected to ask for a higher markup in order to take care of unforeseen contingencies. Beside the fixed lump sum price, other commitments are often made by the contractor in the form of submittal such as a specific schedule, the management reporting system or a quality control program. If the actual cost of the project is underestimated, the underestimated cost will reduce the contractor's profit by that amount. An overestimate has an opposite effect, but may reduce the chance of being a low bidder for the project.

- Unit Price Contract.

In a unit price contract, the risk of inaccurate estimation of uncertain quantities for some key tasks has been removed from the contractor. However, some contractors may submit an "unbalanced bid" when it discovers large discrepancies between its estimates and the owner's estimates of these quantities. Depending on the confidence of the contractor on its own estimates and its propensity on risk, a contractor can slightly raise the unit prices on the underestimated tasks while lowering the unit prices on other tasks. If the contractor is correct in its assessment, it can increase its profit substantially since the payment is made on the actual quantities of tasks; and if the reverse is true, it can lose on this basis. Furthermore, the owner may disqualify a contractor if the bid appears to be heavily unbalanced. To the extent that an underestimate or overestimate is caused by changes in the quantities of work, neither error will affect the contractor's profit beyond the markup in the unit prices.

- Cost Plus Fixed Percentage Contract.

For certain types of construction involving new technology or extremely pressing needs, the owner is sometimes forced to assume all risks of cost overruns. The contractor will receive the actual direct job cost plus a fixed percentage, and have little incentive to reduce job cost. Furthermore, if there are pressing needs to complete the project, overtime payments to workers are common and will further increase the job cost. Unless there are compelling reasons, such as the urgency in the construction of military installations, the owner should not use this type of contract.

- Cost Plus Fixed Fee Contract.

Under this type of contract, the contractor will receive the actual direct job cost plus a fixed

fee, and will have some incentive to complete the job quickly since its fee is fixed regardless of the duration of the project. However, the owner still assumes the risks of direct job cost overrun while the contractor may risk the erosion of its profits if the project is dragged on beyond the expected time.

- Cost Plus Variable Percentage Contract.

For this type of contract, the contractor agrees to a penalty if the actual cost exceeds the estimated job cost, or a reward if the actual cost is below the estimated job cost. In return for taking the risk on its own estimate, the contractor is allowed a variable percentage of the direct job-cost for its fee. Furthermore, the project duration is usually specified and the contractor must abide by the deadline for completion. This type of contract allocates considerable risk for cost overruns to the owner, but also provides incentives to contractors to reduce costs as much as possible.

- Target Estimate Contract.

This is another form of contract which specifies a penalty or reward to a contractor, depending on whether the actual cost is greater than or less than the contractor's estimated direct job cost. Usually, the percentages of savings or overrun to be shared by the owner and the contractor are predetermined and the project duration is specified in the contract. Bonuses or penalties may be stipulated for different project completion dates.

- Guaranteed Maximum Cost Contract.

When the project scope is well defined, an owner may choose to ask the contractor to take all the risks, both in terms of actual project cost and project time. Any work change orders from the owner must be extremely minor if at all, since performance specifications are provided to the owner at the outset of construction. The owner and the contractor agree to a project cost guaranteed by the contractor as maximum. There may be or may not be additional provisions to share any savings if any in the contract. This type of contract is particularly suitable for turnkey operation.

Principles of Competitive Bidding

Competitive bidding on construction projects involves decision making under uncertainty where one of the greatest sources of the uncertainty for each bidder is due to the unpredictable nature of his competitors. Each bid submitted for a particular job by a contractor will be determined by a large number of factors, including an estimate of the direct job cost, the general overhead, the confidence that the management has in this estimate, and the immediate and long-range objectives of management. So many factors are involved that it is impossible for a particular bidder to attempt to predict exactly what the bids submitted by its competitors will be.

It is useful to think of a bid as being made up of two basic elements:

(1) the estimate of direct job cost, which includes direct labor costs, material cost, equipment costs, and direct filed supervision.

(2) the markup or return, which must be sufficient to cover a portion of general overhead

costs and allow a fair profit on the investment.

A large return can be assured simply by including a sufficiently high markup. However, the higher the markup, the less chance there will be of getting the job. Consequently a contractor who includes a very large markup on every bid could become bankrupt from lack of business. Conversely, the strategy of bidding with very little markup in order to obtain high volume is also likely to lead to bankruptcy. Somewhere in between the two extreme approaches to bidding lies an "optimum markup" which considers both the return and the likelihood of being low bidder in such a way that, over the long run, the average return maximized.

From all indications, most contractors confront uncertain bidding conditions by exercising a high degree of subjective judgment, and each contractor may give different weights to various factors. The decision on the bid price, if a bid is indeed submitted, reflects the contractor's best judgment on how well the proposed project fits into the overall strategy for the survival and growth of the company, as well as the contractor's propensity to risk greater profit versus the chance of not getting a contract.

One major concern in bidding competitions is the amount of "money left on the table" of the difference between the winning and the next best bid. The winning bidder would like the amount of "money left on the table" to be as small as possible. For example, if a contractor wins with a bid of $200 000, and the next lowest bid was $225 000 (representing $25 000 of "money left on the table"), then the winning contractor would have preferred to have bid $220 000 (or perhaps $224 999) to increase potential profits.

Some of the major factors impacting bidding competitions include:

- Exogenous Economic Factors.

Contractors generally tend to specialize in a submarket of construction and concentrate their work in particular geographic locations. The level of demand in a submarket at a particular time can influence the number of bidders and their bid prices. When work is scarce in the submarket, the average number of bidders for projects will be larger than at times of plenty. The net result of scarcity is likely to be the increase in the number of bidders per project and downward pressure on the bid price for each project in the submarket. At times of severe scarcity, some contractors may cross the line between segments to expand their activities, or move into new geographic locations to get a larger share of the existing submarket. Either action will increase the risks incurred by such contractors as they move into less familiar segments or territories. The trend of market demand in construction and of the economy at large may also influence the bidding decisions of a contractor in other ways. If a contractor perceives drastic increases in labor wages and material prices as a result of recent labor contract settlements, it may take into consideration possible increases in unit prices for determining the direct project cost. Furthermore, the perceptions of increase in inflation rates and interest rates may also cause the contractor to use a higher markup to hedge the uncertainty. Consequently, at times of economic expansion and/or higher inflation rate, contractors are reluctant to commit themselves to long-term fixed price contracts.

- Characteristics of Bidding Competition.

All other things being equal, the probability of winning a contract diminishes as more bidders participate in the competition. Consequently, a contractor tries to find out as much information as possible about the number and identities of potential bidders on a specific project. Such information is often available in the Dodge Bulletin [Dodge Bulletin (daily publication), F. W. Dodge Corp., New York, N.Y.] or similar publications which provide data of potential projects and names of contractors who have taken out plans and specifications. For certain segments, potential competitors may be identified through private contacts, and bidders often confront the same competitor's project after project since they have similar capabilities and interests in undertaking the same type of work, including size, complexity and geographical location of the projects. A general contractor may also obtain information of potential subcontractors from publications such as Credit Reports (Credit Reports, Building Construction Division, and Bradstreet, Inc., New York, N.Y.) published by Dun and Bradstreet, Inc. However, most contractors form an extensive network with a group of subcontractors with whom they have had previous business transactions. They usually rely on their own experience in soliciting subcontract bids before finalizing a bid price for the project.

- Objectives of General Contractors in Bidding.

The bidding strategy of some contractors is influenced by a policy of minimum percentage markup for general overhead and profit. However, the percentage markup may also reflect additional factors stipulated by the owner such as high retention and slow payments for completed work, or perceptions of uncontrollable factors in the economy. The intensity of a contractor's efforts in bidding a specific project is influenced by the contractor's desire to obtain additional work. The winning of a particular project may be potentially important to the overall mix of work in progress or the cash flow implications for the contractor. The contractor's decision is also influenced by the availability of key personnel in the contractor organization. The company sometimes wants to reserve its resources for future projects, or commits itself to the current opportunity for different reasons.

- Contractor's Comparative Advantages.

A final important consideration in forming bid prices on the part of contractors is the possible special advantages enjoyed by a particular firm. As a result of lower costs, a particular contractor may be able to impose a higher profit markup yet still have a lower total bid than competitors. These lower costs may result from superior technology, greater experience, better management, better personnel or lower unit costs. A comparative cost advantage is the most desirable of all circumstances in entering a bid competition.

Questions

1. Who has the sole power to decide what type of contract should be used for a specific facility to be constructed and to set forth the terms in a contractual agreement?

2. In a lump sum contract, who will bear all the risks?
3. When may some contractors submit an “unbalanced bid”?
4. What may the owner do if the bid appears to be heavily unbalanced?
5. Unless there are compelling reasons, such as the urgency in the construction of military installations, the owner should not use cost plus fixed percentage contract, why?
6. How shall the risks be shared between the contractor and the employer under the cost plus fixed fee contract?
7. How shall the risks be shared between the contractor and the employer under the cost plus variable percentage contract?
8. What are the principles of competitive bidding?
9. What are the major factors impacting bidding competitions?
10. What will influence the bidding strategy of some contractors?

Vocabulary, Phrases and Expressions

construction contract：工程承包合同
a lump sum contract：总价合同
a low bidder：低价投标人
a unit price contract：单价合同
unbalanced bid：不平衡报价
a cost plus fixed percentage contract：成本加固定百分比费用合同
a cost plus fixed fee contract：成本加固定费用合同
a cost plus variable percentage contract：成本加变动比例费用合同
a target estimate contract：目标估算合同
a guaranteed maximum cost contract：保证最大成本合同
decision making：决策
optimum markup：最优增加值
exogenous economic factors：外部经济因素
potential competitors：潜在的竞争者
comparative advantages：相对优势；比较优势

参 考 译 文

第 7 单元　工程承包合同的类型

工程承包合同作为工程定价工具的同时，还规定了风险在参与各方之间的分配。业主拥有单独的权利决定应该为建设一个特定的工程而采用哪种合同形式，并在合同中用条款阐明。掌握各种不同合同形式中承包商的风险是非常重要的。

● 总价合同。

在总价合同中，业主本质上是将所有的风险赋予了承包商，可以料想，承包商继而会寻求更大的增加值以覆盖不可预见的费用。除固定总价外，承包商通常以提供其他文件的形式做出另外的承诺，例如，某一特定的进度计划、管理报告系统或质量控制计划。如果工程的真实费用被低估，那么被低估的费用将减少承包商的利润。被高估的费用具有相反的结果，但可能减小成为工程低价投标人的机会。

● 单价合同。

在单价合同中，承包商不再因某些主要分项工程量的不明确而承担估算不准确的风险。但是，一些承包商在发现自己的工程量估算与业主的估算之间存在很大差距时，可能提交“不平衡报价”。基于对自己估算的信心以及对风险承担的态度，承包商可能在被低估数量的分项工程上略微提高相应单价，而将其他分项工程的单价降低。如果承包商的估算是正确的，承包商就可以增加相当的利润，因为业主的支付是根据实际工程量来确定的；如果业主的估算是对的，承包商的利润则可能据此而减少。此外，如果投标报价过于不平衡，业主可能将该承包商排除在外。就由工程量变化引起的低估或高估这种情况而言，不管估算错误与否，都不会影响承包商所报单价增加值之外的利润。

● 成本加固定百分比费用合同。

对于一些采用新技术或有急迫需求的特定工程，业主有时候被迫承担成本超支的所有风险。承包商将得到实际成本以及固定比例的酬金，因而没有降低工程成本的动力。而且，如果对工程完成时间有急迫的要求，则工人超时工作费用的支付是普遍的，这也将进一步提高工程成本。除非有特殊的原因，例如，紧急军事工程的建造，业主不应采用这种形式的合同。

● 成本加固定费用合同。

在这种合同形式下，承包商将得到实际成本加上固定的酬金，并得到激励而尽快完成工程，因为不管工程历时多久，酬金是固定的。但是，业主仍然要承担工程成本超支的风险，承包商则承担工程实际工期超过预计时间而导致利润减少的风险。

● 成本加变动比例费用合同。

对于这种合同形式，承包商同意在实际成本超过估算成本时接受处罚，或者在实际成本低于估算成本时获得奖励。作为承担自己估算成本风险的回报，承包商被允许以直接成本的变动比例作为报酬。此外，项目工期通常是明确规定的，承包商必须按期限完成工程。这类合同将相当的成本超支风险分配给业主，但也给予承包商激励，尽可能地降低成本。

● 目标估算合同。

这是根据实际成本高于或低于承包商估算的直接成本而给予承包商惩罚或奖励的另一种合同形式。通常，由业主和承包商分担节约或超支部分的比例事先约定，项目工期在合同中明确规定。奖金或罚金根据不同的工程完成日期来确定。

● 保证最大成本合同。

当工程范围清楚定义后，业主可能选择要求承包商承担所有的风险，既包括实际工程成本，也包括工期。任何来自业主方的工程变更想必十分微小，因为项目的功能说明在施工开始前就提供给业主。业主和承包商同意由承包商保证的一个工程成本值作为最大值。在合同中可能有也可能没有附加条款来分享可能的节约额。这种合同形式特别适合于交钥匙工程。

竞争性投标的原则

建设工程的竞争性投标包括在不确定的情况下进行决策，对每一个投标人而言这种不确定的根源之一在于竞争者的不可预知性。承包商为某一特定工程提交的投标将取决于很多因素，包括直接成本的估算、总管理费用、管理者对这一估算的信心以及短期和长期的管理目标。如此之多的因素，使得一个特定的投标人试图准确预测竞争者的投标是不可能的。

将投标分为两个基本组成要素是有用的：

(1) 直接成本的估算，包括直接人工费、材料费、机械费和直接现场管理费。

(2) 增加值或回报，其必须足以覆盖总管理费部分，以及获得相当的投资利润。

只要简单地添加一个足够高的增加值，就能保证高回报。但是，增加值越高，获得工程的机会就越小。因此，在每一次投标中，增加值取得非常大的承包商会因接不到工程而破产。相反，为了获得大量工程而采用低增加值投标策略的承包商也可能导致破产。在两种极端投标方法中，存在一个“最优增加值”，它既考虑回报，也考虑成为低价投标人的可能性，从长远来看，采用这种方法的平均回报最大。

所以现象表明，大多数承包商面对不确定的投标条件，在很大程度上采用主观的判断来应对，每个承包商可能对不同的因素给予不同的权重。如果投标真正提交，投标价格的决策就反映了承包商如何使拟定的计划适合公司生存和发展的整体战略，以及反映承包商对待取得较大利润与失去合同机会这一风险的态度。

关于投标竞争的一个主要问题是“桌面上剩下的钱”为多少，获胜与次最佳投标之间的相差值是多少。获胜的投标人希望“桌面上剩下的钱”越少越好。比如，如果一个承包商以 200 000 美元的投标价获胜，而次低的投标价为 225 000 美元（意味着“桌面上剩下的钱”是 25 000 美元），那么获胜的承包商就希望自己最好以 220 000 美元（也可能是 224 999 美元）投标，以增加潜在的利润。

影响投标竞争的主要因素包括如下几个。

● 外部经济因素。

承包商一般倾向于专注某一专业工程的承包市场以及将他们承包工程的范围集中于特定的区域。在一特定时间，市场的需求水平可以影响投标人的数量和投标价格。当承包市场上的工程稀少时，工程投标人的平均数目将比工程多的时候大。工程稀少的最终结果可能导致承包市场上参加每一工程投标的人数增加，工程投标价格面临向下的压力。当工程严重稀少时，一些承包商可能会越过专业界线以扩展自己的活动范围，或者迁移到一个新的地区谋求获得已有承包市场上的更大份额。任何一个这样的行动，都会增加承包商的风险，因为他们是进入一个不熟悉的专业领域或地区。工程的市场需求趋势和经济的变化趋势也可能以另一种方式影响承包商的投标决策。如果承包商感到按目前签订的人工合同的结果，工人工资和材料价格会大幅度提高，则其在确定直接成本时可能考虑适当提高单价。此外，如果预感通货膨胀率和利率会提高，也可能会引起承包商采用较高的增加值来规避不确定性。因此，当在经济膨胀和/或通货膨胀率较高时，承包商不愿意签订工期较长的固定价格合同。

● 投标竞争的特征。

与所有其他情形一样，如果有许多人参加竞争，赢得合同的可能性就会减小。因此，承包商总是试图获得尽可能多的有关某一特定工程潜在投标人数目和投标人特点的信息。这种信息常常可以在 Dodge 报告(Dodge 报告（每日出版），F. W. Dodge 公司，纽约)中获取，或是从提供拟招标工程的数据和已经取得计划和说明书的承包商的名单的类似出版物中得到。对于某些特殊的专业，潜在竞争者的情况可能通过秘密方法确定，投标人经常在一个接一个的工程上与相同竞争者相遇，因为他们对承担同一类型的工程，包括规模、复杂性以及地理位置都有相同的能力和兴趣。总承包商也可以从由 Dun & Bradstreet 公司出版的 Credit 报告(Credit 报告，Building Construction Division ，Bradstreet 公司，纽约)这样的出版物中得到潜在分包商的信息。但是，大部分总承包商是通过与以前有过交易的分包商群建立的广泛网络，从中获取潜在分包商的信息的。在最后确定工程投标价格之前，他们通常是根据自己的经验来选择分包商的。

● 投标中总承包商的目标。

一些承包商的投标战略受增加值比例最小这样的投标方针的影响，以此获得总管理费和利润。但是，增加值比例也可能反映业主规定的其他因素，例如，承包商对已完工工程较高的保管率及其业主缓慢的支付，或对经济中不可控制因素的预计。对投标某一特定工程的努力程度，受承包商对获得更多工程渴望程度的影响。对于承包商来说，获得某一特定工程对所有进行中的工程或在隐含的现金流方面可能具有潜在的重要性。承包商的决策还受到能否从承包商自己的组织中获得关键人员的影响。公司有时候需要为将来的工程储备资源，或由于其他不同的原因而集中关注于目前的机会。

● 承包商的比较优势。

承包商在确定投标报价时考虑的最重要的因素是来自公司可能的特殊优势。作为低成本的结果，某一承包商就可能加上一个有较高利润的增加值而使总的投标价格仍比其他竞争者低。这些更低的成本可能来自于先进的技术、丰富的经验、优秀的管理、出色的员工或者较低的单位成本。比较成本优势是参与投标竞争时在所有的措施中最有价值的。

Unit 8　Tendering Procedure(1)

The FIDIC Conditions of Contract envisage that a contractor will be selected by the Employer following competitive tendering.

Experience has shown that, for major projects and those involving international tendering, prequalification of tenderers is desirable since it enables the Employer /Engineer to establish, in advance, the competence of firms subsequently invited to tender. It also ensures that invitations are addressed to leading companies who would not necessarily participate in open or unrestricted tendering. Such unrestricted tendering does not always facilitate appropriate competition because the number of tenderers may be so great as to make the odds against tendering successfully unacceptable. Additionally, prequalification has the advantage of reducing the inflationary effect which must arise where firms incur unproductive expense in submitting a large number of tenders in the knowledge that a high proportion of these must be unsuccessful.

The documents issued to tenderers (the Tender documents) normally comprise Conditions of Contract, Specification, Drawings, Bill of Quantities and form of Tender, together with Instructions to Tenderers. All except Instructions to Tenderers become Contract documents on award of Contract. It is usual to send the Tender documents to tenderers under cover of a letter which should be limited to identifying the documents and giving the recipient an invitation to tender.

Conditions of Contract

The Conditions of Contract will consist of Part I and Part II of the Red Book. The Conditions set out the legal /contractual arrangements that will apply to the Contract.

Specification

The Specification will define the scope and the technical requirements of the Contract. The quality of materials and the standards of workmanship to be provided by the Contractor must be clearly described, together with the extent, if any, to which the Contractor will be responsible for the design of the permanent works. Details must be included of samples to be provided and tests to be carried out by the Contractor during the course of the Contract. Any limitations on the Contractor’s freedom of choice in the order,timing or methods of executing the work or sections of the works must be clearly set out and any restrictions in his use of the site of the works, such as the provision of access or space for other contractors, must be given.

Drawings

The Drawings must be in sufficient detail to enable tenderers to assess accurately, in conjunction with the Specification and the Bill of Quantities, the nature and scope of work

included in the Contract. Only rarely is it possible to provide, at tender stage, a complete set of drawings so fully detailed that the work can be executed without any further drawings becoming necessary. On most contracts supplementary drawings will be issued after award as work proceeds.

Bill of Quantities

The Bill of Quantities is a list of items giving descriptions and estimated quantities of work to be executed under the Contract. The Red Book assumes a remeasurement form of contract, although that does not preclude the inclusion of a number of lump sum items in the Bill of Quantities provided that the scope of work to be covered by each lump sum item is adequately defined.

The Tender

It is highly desirable when inviting competitive offers from a number of tenderers, that the tenders received should be based as far as possible on equal terms and conditions and presented in a standardised manner. In this way evaluation and comparison between the tenders received can be made more simply and accurately with less risk of misunderstandings, errors and omissions.

The Tender is the most important single document submitted by the tenderer. It is here that each tenderer confirms that he has read and understood the requirements of the Tender documents and based on such requirements. It is here that he states his tender sum for undertaking and fulfilling all his obligations under the Contract. It is therefore essential for the Employer that all Tenders received are stated in identical terms and thus it is necessary for the Employer, when inviting Tenders, to provide tenderers with a standard form of tender which each tenderer is required to complete and sign.

The form of Tender which is included at the end of the first volume of the Red Book following Part I of the Conditions of Contract is recommended for this purpose. It is short , it is clear and when signed and submitted creates a legally binding and valid offer.

It is common for Tenders to be identified by a tender reference or contract number which should be added to link the Tender to the project in question.

The organisation to which the Tender is being submitted must be stated in the appropriate space on the form.

The sum to be entered under paragraph 1 of the Tender is the tenderer's total Tender sum, which should be the same as the total from the summary page of the Bill of Quantities. The amount shall be entered in words and in figures and in the event of a discrepancy between the two it is common practice in most countries that the written amount shall prevail over the amount expressed in figures.

The sum agreed may vary during the execution of the project depending on what circumstances occur, e. g. the instruction of variations, the occurrence of unforeseen events,

which in accordance with the Conditions of Contract entitle the Contractor to additional (or reduced) payment.

Under paragraph 4 the Employer must state the time during which he requires the Tender to remain valid and open to acceptance. This time should be adequate to permit proper evaluation and award procedures to be completed.

In the event that the stated time proves to be insufficient, the Employer may ask tenderers to extend the period of validity of their Tenders for a further named period. At the same time tenderers should be asked to extend the validity of any tender bond accordingly. Tenderers are free to extend or not, if so requested, and in the event that they choose not to do so, the Employer has no right to cash or hold their tender bond.

Instructions to Tenderers

Instructions to Tenderers must be prepared to meet the requirements of individual contracts. Their purpose is to convey information and instructions which apply during the tendering period. Any material on which it is intended to rely after award must be included elsewhere, e. g. in the Conditions of Contract or the Specification.

The following notes provide a guide to subjects to be covered, but they are not necessarily exhaustive.

(1) General. Under this heading should be included brief details of the organisation (Government, Ministry, Department, Authority, etc.) calling for Tenders, together with an outline of the project to be covered by the Contract.

Any stipulations regarding firms and persons qualified to tender, such as prior prequalification and/or requirements in the event of formation of joint ventures, should be stated, together with details of any special requirements to establish the validity of the Tender and the authority of the signatory, e. g. Power of Attorney.

Tenderers must be advised if the successful tenderer will be required to establish a locally registered company for the purpose of the Contract.

(2) Documents. A list of documents issued to tenderers should be included together with instructions as to which of these documents must be completed by the tenderer and handed in on the submission date.

If the Tender documents are not issued free of charge then the sum required for the original set and for any additional sets should be stated and whether payment is to be made in local or equivalent foreign currency. Tenderers should be advised as to how the extra sets of documents can be obtained and also of procedures to be followed for the return of the documents by unsuccessful tenderers.

(3) Completion and Submission of Tenders. Concise instructions as to the time, date and place for the submission of Tenders should be given.

It should also be made clear to tenderers that all entries and signatures should be in indelible

ink and that no erasures or additions are permitted other than those necessary to correct errors. All such corrections must be initialled.

It is normal to ask for more than one copy of the Tender, in which case tenderers should be instructed as to the manner in which the Tenders are to be packaged.

It is usual to stipulate that one set of documents should be clearly marked “Original Tender” and others marked “Copy” , and that if there are discrepancies the Original Tender takes precedence. Photocopies of the Original Tender minimize the risk of discrepancies.

The tenderer should be told whether, if he has handed in his Tender before the formal submission date or has sent it by post, he has the right to withdraw, modify or correct it after dispatch. This would normally be permitted, provided that a request for modification, etc. , has been received by the Employer either in writing or by cable, telex or facsimile transmission before the time set for receiving Tenders. The Original Tender as amended would then be considered as the official offer.

(4) Supplementary Information Required. Tenderers should be advised of any supplementary information to be submitted with the Tender documents , such as details of the proposed sureties for any performance security, general terms of insurance, the constitution of the tenderer’s organization together with the address to be used for the purposes of the Contract, a preliminary programme of work (the Instructions to Tenderers should give an indication of what is required) and a list of major items of Contractor’s Equipment required for the purpose of executing the works.

A forecast of labour and staff, local and foreign, may be requested. Where a Tender sum has been requested on the basis that it is adjustable by reason of changes in the cost of labour, materials and transport, the tenderer should, unless the particulars are given by the Employer in the Tender documents, be requested to indicate the formula or formulae which he wishes to use as the basis for adjusting the sum. If his formula is to be index based, officially published indices should be used. These would normally be indices published in the country where the project is to be located. The Tenderer should also provide the names of any subcontractors he proposes to employ, together with details of those parts of the works proposed to be subcontracted.

It must also be made clear in the Instructions to Tenderers to what extent the supplementary information is required by the Employer purely to demonstrate that the tenderer has understood the extent and nature of the work and the programme required and to what extent, if at all, the supplementary information is required as a part of the offer for inclusion in the Contract documents on award.(to be continued.)

Questions

1. Why is prequalification necessary for major projects and those involving international tendering?

2. What should be included in the specification?
3. Is it possible to provide a detailed complete set of drawings at tender stage? Why?
4. What is the bill of quantities?
5. Why is the tender the most important single document submitted by the tenderer?
6. Why dose the tender sum agreed may vary during the execution of the project?
7. What is the purpose of "instructions to tenderers" ?
8. What should be included or stated under the heading "general" in "instructions to tenderers" ?
9. On what condition is the tenderer permitted to withdraw, modify or correct his tender after dispatch?
10. What are the supplementary information required to be submitted with the tender documents?

Vocabulary, Phrases and Expressions

tender：招标；投标
competitive tendering：竞争性招标
prequalification：资格预审
conditions of contract：合同条件
specification：规范；详述；说明书
drawings：图纸
bill of quantities：工程量表
instructions to tenderers：投标者须知；投标者指令
contract documents：合同文件
permanent works：永久性工程
standards of workmanship：工艺标准
supplementary drawings：补充图纸
tender reference number：投票参考编号
contract number：合同编号
award procedures：授予程序
period of validity of tenders：投标书的有效期
tender bond：投标保函；投标保证金
original tender：投标书正本
official offer：正式报价
supplementary information：补充信息

参 考 译 文

第8单元 招标程序(1)

FIDIC合同条件设想由雇主采用竞争性招标方式选择承包商。

经验表明，对于大型的和涉及国际招标的项目来说，对投标者的资格预审是必须的。因为，通过资格预审可以使雇主(或工程师)提前了解应邀投标的公司的能力。同时，也保证了向不一定愿意参加公开或无限制投标的大公司发出邀请。那种无限制招标并不总是有利于合理竞争，因为投标者数量可能太多以致影响到成功的投标反而不能被接受。此外，如果各公司明知大部分投标不可能中标仍递交大量投标，它们将为此付出无效的费用从而导致大量的多余投标，而资格预审就具有减少上述多余投标的优点。

颁发给投标者的文件(招标文件)一般包括合同条件、规范、图纸、工程量表、投标书格式以及投标者须知。除投标者须知外，上述全部文件在授予合同时构成为合同文件。通常，把招标文件连同一封信函送给投标者，信函仅限于说明上述文件并发给收件人一份投标邀请书。

合同条件

合同条件由红皮书第一部分和第二部分组成。条件说明了适用于合同的法律(或契约)安排。

规范

规范将规定合同的范围和技术要求。对承包商提供的材料的质量和工艺标准，以及承包商对永久性工程的设计所负责的程度(如有时)，必须做出明确规定。规范还应包括合同期间承包商提供的样品及其进行的试验的细节；对承包商实施工程或区段的顺序、时间安排或方法的选择自由如有任何限制时，都需明确规定；同时还需给出对承包商使用工程现场的任何限制，例如，为其他承包商提供通道和空间。

图纸

图纸必须足够详细，以使投标者在参考了规范和工程量表后，能准确确定合同所包括的工作性质和范围。在投标阶段，极少可能提供出一整套完备的图纸，从而也极少可能在不需要提供任何进一步的图纸的情况下进行工作。对于大多数合同来说，补充图纸将在授予合同之后的工作中发放。

工程量表

工程量表是一个项目清单，载有按照合同实施的工作的说明以及估算的工程量。红皮书采用合同重新计量的方式，虽然这并不排除工程量表中包含有若干个包干项目，只要每一包干项目包含的工作范围有详细的规定即可。

投标书

当邀请众多投标者参与竞争性报价时，所收到的标书应尽可能地基于平等的条款和条

件，并应以标准格式提交，这一点是十分必要的。因为，这样做有利于更为简单、准确地对收到的投标进行评价和比较，并能减少出现误解、错误和遗漏的可能。

投标书是投标者提交的最重要的单项文件。在此文件中，每位投标者确认他已阅读了招标文件并理解了其中的要求，基于这些要求，在此文件中，他申明了用于承担和完成合同规定的全部义务的投标金额。因而，对雇主来说，收到的所有标书应是根据统一条件制定的，招标时，雇主有必要为投标者提供统一标准的标书格式，要求每位投标者全部填写和签字。

为此目的，建议采用附在红皮书第一卷后面紧接合同条件第一部分的投标书格式。 它既简短又明确，一经签字和提交，报价即生效，并具有法律约束力。

通常，为了将投标书与有关工程项目联系在一起，投标书应标明投标参考编号或合同号码。

在投标书格式的适当位置，必须标明将标书送交的机构的名称。投标书第一段填写的金额为投标者的投标书总金额，该金额必须与工程量表之一览表中所列的总价一致。该金额应同时用文字和数字填写，如文字和数字之间存在差异，大多数国家的一般惯例是，文字标明的金额应优先于数字表达的金额。

双方同意的金额可能在项目实施过程中根据发生的情况而变化。如变更指示，出现不可预见事件。对此，应根据合同条件使承包商能够得到增加或减少的付款。

在投标书第四段中，雇主必须注明其要求投标书保持有效和同意被接受的时间。这一时间应能满足用来完成适当的评估和授予合同的程序的要求。

倘若发现注明的时间不能满足要求，雇主可要求投标者将其投标书的有效期再延长一段指明的时间。同时，还应要求投标者相应的延长任何投标保函的有效期。投标者在接到此类要求后，有权决定是否延长。倘若他们决定不予延长，则雇主无权将他们的投标保函兑换成现金或持有该保函。

投标者须知

必须编制投标者须知以满足每一具体合同的需要。“须知”的目的在于，把招标期间适用的信息和指令传递出去，但在授标之后需作为依据的任何资料都必须被包括在另外的文件中，如包括在合同条件或技术规范中。

以下解释提供了一个“须知”内容的指南，但不一定很全面。

(1) 概述。在此标题下，应包括对招标机构(政府、部、部门、当局等)的简短的具体介绍，以及合同所包含的项目的概况。

涉及有资格投标的公司或个人的任何规定，诸如提前资格预审和(或)对组成联营体的要求以及有关确定投标书有效性和签署人的权利(如代理人的权利)的任何特殊规定的详细情况，应予申明。

如果要求中标者因合同建立一个在当地注册的公司，须告之投标者。

(2) 文件。颁发给投标者的文件中应包括一份文件清单，此类文件清单应说明其中哪些文件应由投标者填写并在规定的提交日期提交。

如果招标文件不是免费发放的，则应说明一套正本和任何附加套数的应收金额，并说明是否使用当地货币或等值外币支付。还应告诉投标者如何获得额外的各套文件，以及未

中标的投标者退还这些文件时应遵循的程序。

(3) 投标书的完成与递交。应给出有关提交投标书的时间、日期和地点的简明指示。

还应向投标者说明所有条目和签字均应使用不褪色墨水，除非必须改正的错误，否则，不允许任何的删减或增加，所有的改正均须草签。

通常，均要求一份以上的投标书副本。在此情况下，应对投标者装订投标书的方法加以指导。

通常规定，一套文件应清楚地标明“投标书正本”，其他均应标明“副本”，如出现差异，投标书正本优先。投标书正本的影印本可将出现差异的风险降至最低程度。

应告诉投标者，如果在正式提交日期之前他已提交或邮寄出投标书，他是否拥有在发送之后撤回、修正或更改投标书的权力。如果在收到投标书的规定时间之前，雇主已收到以书面或以电报、电传、传真等方式进行修改的请求，一般是允许的。修改后的投标书正本被认为是正式的报价。

(4) 要求提供的补充信息。应将随投标文件同时提交的任何补充信息告之投标者，例如，为任何履约担保所拟用的保证人的详情；保险的一般条件；投标者的机构组成和为合同所使用的地址；工作的初步进度计划(投标者须知中应说明要求)；以及为施工目的所需要的承包商的设备的主要项目一览表。

可能需要对当地和外国的劳务与职员的需求量进行预测。当要求投标书的金额可以因劳务、材料和运输成本的变化进行调整时，应要求所有投标者，说明他希望使用的作为调价基础的一种或几种计算公式，除非招标文件中已含有雇主给出的详细说明。如果其公式以指数为基础，那么，就应使用正式发布的指数。这些指数一般是项目所在国已公开发布的。投标者还须提供其拟雇用的任何分包商的姓名及其准备分包的那部分工程的细节。

同时还须在投标者须知中说明，完全为表明投标者对工作范围和性质以及所要求的进度计划的理解，雇主所需的补充信息的程度，以及在进行合同授予时，作为包含在合同文件内的报价的一部分所需的补充信息的程度。(未完待续。)

Unit 9　Tendering Procedure(2)

5) Amendments to Tender Documents

It is possible that explanations, revisions, additions or deletions to the documents issued to tenderers may be necessary during the tendering period. Tenderers should be told how these will be dealt with, the normal method being by formal addenda. If a tenderer is in doubt about the meaning of some item in the Tender documents, he should be advised to notify the Engineer not later than a given number of days (e. g. 42 days) before the Tender submission date. The Engineer will then issue to all tenderers an explanation in the form of an addendum. Each addendum should be accompanied by a receipt form which must be returned so that the Employer and the Engineer have confirmation that each tenderer has received all the necessary information. Failure to acknowledge receipt of an addendum may result in rejection of a Tender. The addenda become part of the Tender documents and the numbers issued should be inserted by tenderers in the space provided in paragraph 1 of the form of Tender.

Tenderers would normally be required to submit their offers strictly in accordance with the requirements of the Tender documents. If tenderers are permitted to offer an alternative Tender, any departure from the documents issued to tenderers should be clearly identified and detailed. The option to submit alternative Tenders may make the evaluation process difficult.

6) Currency Requirements and Exchange Rates

Tenderers should be required to give notice to the Employer of the various currencies in which they may wish to be paid if the Contract is awarded to them. This information should be supplied as soon as possible after invitations to tender have been issued and not less than a given number of days (e. g. 42 days) before the Tender submission date.

The Employer may wish to specify in the Instructions to Tenderers that payments will be made only in the currencies of the countries from which the goods and services are to be acquired.

The Tender documents should include a schedule in which tenderers record the sums in the various approved currencies that together constitute their total Tender sum. This schedule becomes part of the Contract when awarded.

It is common practice to require tenderers to submit their Tenders in a single currency—usually of the country in which the Works are to be executed. If this is the case it is necessary to define the rates of exchange which have been used to convert the various currencies, in which payment is required, into a single currency unit. As more than one tenderer may request part payment in one particular currency, it is preferable that the exchange rates to be used should be consistent and, therefore, that they should be defined by the Employer and notified by him, or the Engineer on his behalf, to each tenderer a reasonable time before the date of submission. In

accordance with Sub-Clause 72.2 of the Conditions of Contract, these rates shall be stated in Part II or if not so stated, shall be those prevailing, as determined by the Central Bank of the country in which the works are to be executed, on the date 28 days prior to the latest date for the submission of Tenders or as provided for in the Tender. The rates quoted are incorporated in the Contract when awarded.

In order to assist in forward budgeting it is useful to request tenderers to provide an estimate of the payments to be made by the Employer to the Contractor during the period of the Contract, preferably in quarterly periods.

The estimate of payments referred to above does not become a part of the Contract and should not be regarded as binding. The figures may have to be reviewed and adjusted as the work proceeds. Expenditure under Provisional Sums will affect the figures, and so also will changes in the source of supply of materials and modifications to the programme or variations of the Works.

7) Site Visits

It is customary to expect tenderers to visit the site of the project during the tender period. Details should be given of the date and arrangements for visiting when staff of the Employer and the Engineer will be on site to answer questions and when any exploratory work carried out will be available for inspection, e. g. borehole cores laid out and exploratory adits lit. A summary of all questions and answers thereto should be issued to all tenderers. Tenderers should not be restricted in their site visits and details of who to contact for further visits should be given.

8) Tender Bond

If a tender bond is required, a pro forma version of such bond should be included in the Tender documents. The amount of the bond should be stated and the currency or currencies required. In all cases the surety or sureties must be satisfactory to the Employer. If a tender bond has been requested, any Tender that has not been so secured will be rejected unless otherwise indicated.

Tenderers should be advised that the bond will be released after a specified period, or earlier if one of the Tenders has, within the period, been accepted by the Employer and an acceptable performance security has been submitted by the successful tenderer. It should also be made clear what will happen to the tender bond if the tenderer who has been accepted fails to provide a performance security within a specified number of days after being requested to do so. Usually the tender bond will be forfeited.

9) Bonus

If a bonus in relation to early completion is to be included in the Contract, tenderers should be reminded to state in the space provided in the Appendix to Tender what proportions of local and foreign currencies they wish to receive if they earn it.

10) Local Legislation

If there are any local laws or decrees or any special arrangements which the Employer wishes the tenderers to note particularly, these should be listed in the Instructions to Tenderers. It should be made clear that the list is not comprehensive.

11) Examination of Tenders

Tenderers should be advised that the Employer, or the Engineer on behalf of the Employer, may ask any tenderer for clarification of his Tender, but that no tenderer will be permitted to alter his Tender sum after Tenders have been opened. Clarifications that do not change the Tender sum may, if they are acceptable, be incorporated in the Contract. It should be made clear that all Tenders must remain valid for a specified validity period and any extension thereto agreed to by the respective tenderer.

Tenderers should be advised if any factors other than the Tender sum, such as foreign currency proportions, are to be taken into account when evaluating Tenders.

12) Acceptance of Tender

The Employer will normally state that he does not bind himself to award the Contract to the tenderer submitting the lowest tender or to any tenderer.

Evaluation of Tenders

Tenders for major and international contracts are generally opened in public when the names of the tenderers are announced together with the Tender sum. No other details are given at that time. Thereafter the Tenders are checked and studied by the Engineer on behalf of the Employer.

One of the first tasks of the Engineer is to establish whether the Tenders are arithmetically correct and, if they are not, how to overcome any errors. Another task is to check that the Tenders are responsive, that all the required information has been provided and that everything is consistent with the terms of the Tender documents.

If errors, omissions or inconsistencies are apparent a meeting should be held with the lowest tenderer, and possibly with one or two other tenderers, to clarify the position and to agree how to deal with the points in the event of an award. At such meetings, tenderers should not be permitted to change the substance of their Tenders. If it does not prove possible to clarify and agree how differences are to be resolved , the particular Tender should be treated as unresponsive and no further consideration should be given to that Tender.

Award of Contract

When the Engineer has completed the evaluation of tenders, and has obtained any necessary clarifications, he will make a recommendation to the Employer on the award of the Contract. If the Employer agrees with the Engineer’s recommendation and is in a position to award the Contract immediately he will issue a Letter of Acceptance to the successful tenderer.

On occasions certain steps may still be necessary before the Employer can award the Contract, e. g. Government approval or ratification of a loan agreement. In such a case, the Employer may decide to issue to the potential Contractor a letter of intent. Such a letter should state the conditions that must be met before the award can be made. In most cases letters of intent are worded in such a way as to create no commitment on the part of the Employer and the potential Contractor carries out any preliminary work or incurs costs at his own risk. Sometimes a letter of intent gives instructions to the potential Contractor to take some action, such as to order materials and plant or to carry out limited work. In this case, it is necessary for the letter of

intent to be clear about how, and to what extent, the potential Contractor will be paid for what he does if, for any reason, the Contract is not ultimately entered into.

In most cases it is the Employer's Letter of Acceptance which, together with tenderer's Tender, will form a binding Contract between the two parties. valid from the date of issue of the Letter. If on account of errors, omissions or inconsistencies in the Tender, or for any other reason, any changes have been tentatively agreed at a meeting of clarification, the Employer's letter may constitute only a counter-offer and the Contract will only be binding on the date that the Contractor acknowledges and confirms, in writing, agreement to the terms of the Letter of Acceptance.

Contract Agreement

The Conditions of Contract, Sub-Clause 9.1, make provision for the execution of a Contract Agreement between the parties which will record all the terms of the Contract between them. However, the execution of this document is not normally necessary to create a legally binding contract.

Nevertheless, in some countries a Contract Agreement is a requirement of law to create a binding Contract irrespective of the existence of a Tender and a Letter of Acceptance. In such cases, in particular, the Contract Agreement must be carefully prepared to comply with the requirements of the relevant law.

It is important to ensure that the exact wording of the Contract Agreement, including the documents listed as forming part thereof, properly records what has been agreed. The parties must ensure that the signatories and method of signature are in accordance with all the applicable laws.

Questions

1. What is the normal method for dealing with the explanations, revisions, additions or deletions to the documents issued to tenderers?
2. Why does the option to submit alternative tender make the evaluation process difficult?
3. What are the tenders required to do in terms of currency/currencies they intent to use to submit their tender and payment they will receive?
4. What is preferable if terderers request part payment in one particular currency?
5. What will happen to the tender bond if the tenderer fails to provide a performance security within a specified number of days?
6. What are the tasks of the engineer in the evaluation of tenders?
7. What should be the engineer do if errors, omissions or inconsistencies are apparent in tenders?
8. What should a letter of intent contain in most cases?
9. What makes a binding contract between the employer and the potential contractor in most cases?
10. Why is the contract agreement a requirement in some countries?

Vocabulary, Phrases and Expressions

formal addenda：正式补遗
receipt：回执；收据
an alternative tender：含替代方案的投标书
currency requirements：货币要求
exchange rates：汇率
tender submission date：投标书提交日期
provisional sums：暂定金额
site visits：现场考察
appendix to tender：投标书附录
a bonus in relation to early completion：提前完工奖金
local laws or decrees：当地法律或法令
acceptance of tender：中标
evaluation of tenders：评标
award of the Contract：授予合同
a letter of acceptance：中标函
contract agreement：合同协议
signatories：签署人

参 考 译 文

第 9 单元　招标程序(2)

5) 招标文件的修正

在招标期间可能有必要对发给投标者的文件进行解释、修正、增加或删减。应告诉投标者处理这些问题的方式，一般采用正式补遗的方式。如果投标者对招标文件中的某一条目的含义存有疑问，应建议他在投标书提交日期前某一确定的期限(例如 42 天)内通知工程师。然后，由工程师以补遗的方式向所有投标者进行解释。每项补遗必须附有回执，以便雇主与工程师确信每位投标者均已收到所有必要的信息。如未能告知收到补遗，可能导致投标书被拒绝。补遗成为招标文件的一部分，发出的编号应由投标者填入投标书第一段所预留的空白处。

通常，要求投标者严格按照招标文件的要求提交报价。如果投标者被允许提交一个含有替代方案的投标书，则其中与颁发给投标者的文件任何相偏离的地方均应清楚地标明并详细说明。允许提交替代方案的投标书的做法可能使评标过程更困难。

6) 货币要求与汇率

如果将合同授予投标者，就应要求他们通知雇主，他们希望雇主支付何种货币。此类信息应在招标文件颁发之后，并于投标书提交日期之前不迟于某一特定的期限(如 42 天)内

尽快提供。

雇主可能希望，在投标者须知中规定仅使用获得货物和服务的国家的货币进行支付。

招标文件应包括一份计划表，表中由投标者记载构成投标总金额的各种经批准的货币金额。授予合同时，此类计划表构成合同的一部分。

通常的做法是，要求投标者提交标书时使用单一货币，一般为工程实施所在国的货币。在此类情况下，有必要确定把要求支付的各种货币兑换成单一货币而采用的汇率。由于不止一位投标者可能要求部分支付使用某一特定货币，采用的汇率以一致为宜。所以，上述汇率须由雇主确定，并在提交投标书前的一段合理时间内，由雇主或由工程师代表雇主通知每位投标者。根据合同条件第 72.2 款，此类汇率应在“第二部分”中规定。如果没有这样的规定，则采用提交投标书截止日期前 28 天当天，或按投标书中规定的日期，由工程实施所在国中央银行确定的通行汇率。授予合同时，此类汇率应载入合同中。

为了有助于提前预算，要求投标者提供一个在合同期间(以每季度为宜)雇主应支付给承包商款项的估算额是必要的。

上述付款的估算额不构成合同的一部分，因而不应被认为具有约束力。其数额在工作进程中可能不得不加以复查和调整。暂定金额下的支出将对数额产生影响，同样，材料来源的变化、进度计划的修正或工程变更也将影响此类数额。

7) 现场考察

投标期间常期望投标者前往现场考察。当雇主的职员和工程师可在现场回答问题并可将已进行的任何勘探工作(如展示钻到的岩芯和有照明的勘探平洞)提供视察时，则应安排考察的具体日期和相关事宜。上述所有有关问题和回答的概要情况，应发给所有投标者。投标者的现场考察不应受到限制，同时，还应给出再次考察时与何人联系的细节。

8) 投标保函

如果需要投标保函，保函的形式文本应被包括在招标文件中，并需要说明保函的金额及所要求的一种或几种货币。在所有情况下，担保人必须使雇主满意。如果要求提交投标保函，则未附保函的任何投标书将会被拒绝，除非另有说明。

应通知投标者，在规定的一个时间段后保函将被送还。如果其中一份投标书在该时间段内被雇主接收，且中标者已提供了一个可接受的履约保证，则该保函将被提前送还。同时还应说明，如发生上述情况，投标保函将面临的问题，即如果已被接受的投标者在被要求提供履约保证之后未能于规定的时间内提交履约保证，通常，投标保函将被没收。

9) 奖金

如果合同中包括有关提前竣工的奖金，假如投标者能够获得此类奖金，则应提醒他们，在投标书附件中预留的空白处，标明他们希望收到的当地货币与外币的比例。

10) 地方法规

如果有任何地方法律或条例，或雇主希望投标者格外注意的任何特殊协议，则应将它们列入投标者须知中，但应说明，所列文件并不全面。

11) 对投标书的审查

应告知投标者，雇主或代表雇主的工程师也许会要求任何投标者阐明其投标书，但在开标之后则不允许任何投标者改变其投标金额。未改变投标金额的投标书说明如被接受，则可纳入合同中。

应当说明，所有投标书必须在规定的有效期内保持有效，或在每位投标者同意的任何

延长期内保持有效。

评标时，如果考虑投标金额以外的任何其他因素，如外币比例，则应告知投标者。

12) 中标

雇主一般将正式声明，他自己不受将合同授予报价最低的投标者或任何投标者的约束。

评标

大型国际合同的投标一般均采用公开开标的形式，届时公布投标者姓名及其投标金额。此时，不公布其他任何细节。随后，由工程师代表雇主对投标书进行审查和研究。

工程师的首要任务之一是核实投标书的计算是否正确，若不正确，应怎样纠正每一个错误。另一任务是检查投标书是否全部填写，所有要求的资料是否已提交以及所有事项是否与招标文件条款相一致。

如果有明显的错误、遗漏或不一致，可召开一次标价最低的投标者以及另外一两位其他投标者可能参加的会议，就一旦签订合同时如何解决上述问题表明态度并达成一致意见。在会议期间，不允许投标者改变其投标书的内容。如果无法就怎样解决差异表明态度并取得一致意见，则此类投标书应按没有全部填写的投标书处理，且对此类投标书不再予以考虑。

授予合同

工程师完成评标并得到必要的澄清之后，他将就授予合同之事向雇主提出建议。如果雇主同意工程师的建议并准备立即授予合同，他将向中标者颁发中标函。

在雇主授予合同之前，有时某些步骤可能仍然是必要的，如政府对贷款协议的批准或认可。在此情况下，雇主可以决定向有望中标的承包商颁发一意向书。此类意向书应说明，在能够被授予合同之前必须达到的条件。在大多数情况下，在意向书的措辞中雇主一方不做任何许诺。因此，有望中标的承包商只能自担风险进行任何准备工作或支付各类费用。有时，意向书能够指示有望中标的承包商采取某种行动，如订购材料和设备或进行有限的工作。在此情况下，意向书有必要阐明，如果由于任何原因没有最终缔结合同，对该有望中标的承包商所做的工作应如何支付，以及支付的程度。

在大多数情况下，雇主的中标函连同投标者的投标书组成一个对双方都具有约束力的合同，并自中标函颁发之日起生效。如果由于投标书中的错误、遗漏或不一致，或因任何其他原因，在澄清问题的会议上已对任何变动暂时达成协议，则雇主的信函仅作为一个还价，在承包商回函并以书面形式确认同意中标函的条件之日起，合同才具有约束力。

合同协议

合同条件第 9.1 款对记录双方全部合同条款的合同协议书的实施作了规定，然而，此文件的实施一般并不一定产生具有法律约束力的合同。

在一些国家，尽管已有投标书和中标函，然而，要产生一个具有约束力的合同，法律仍要求有一个合同协议书。在此情况下，尤其需要细心编制合同协议书以符合有关法律的要求。

保证合同协议书(包括构成协议书一部分的文件)的准确措辞严格地记录业已达成的协议，这是很重要的。

双方必须保证签署人和签署方法符合所有适用的法律。